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THE APPRAISAL
OF THE
NEWBORN INFANT

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CONTENTS

Introduction.....	Page 1
Basis of appraisal.....	2
Socioeconomic factors.....	2
History.....	2
Family history.....	2
Infant's history.....	3
Physical examination.....	6
Measurements.....	7
Temperature.....	8
General observations.....	8
Skin.....	10
Lymph nodes.....	11
Head.....	11
Neck.....	13
Chest.....	14
Abdomen.....	15
Genitalia.....	16
Anus.....	16
Joints, bones, and muscles.....	16
Tests for reflexes.....	17
Other tests.....	19
Reexamination during and at the end of neonatal period.....	24

The Appraisal of the Newborn Infant

INTRODUCTION

The necessity for careful and adequate appraisal of the infant during the neonatal period has not been generally appreciated, nor have methods for making such an appraisal received sufficient attention. (The term "neonatal" is used to describe the period from birth through the first 30 days of life.) The neonatal period is one of great danger to the infant as well as one about which too little is known. That more attention should be given to the appraisal of the newborn infant and to his care is indicated by the high mortality rate among infants in the first month of life. It is well known that, although the mortality in the first year of life has been greatly reduced during the past 15 years, the mortality in the first month of life (neonatal mortality) has been reduced relatively little and the mortality on the first day of life has not been reduced at all. Contributions to knowledge of the problems concerning the neonatal period have been made through intensive study of individual infants as well as of groups of infants, but the information at hand with regard to these problems must be carefully evaluated and made readily available to all physicians. It is obvious, furthermore, that if appraisal is to be adequate new information must be collected, particularly in regard to well infants. The appraisal of the newborn infant will, of course, be made more exact by improvement in clinical methods of examination, by establishment of certain standards of growth and development, and by more intensive study of causes of neonatal deaths, supplemented by post-mortem and other laboratory examinations.

It is hoped that this bulletin will be useful to physicians in the examination of newborn infants and in the interpretation of the findings.

BASIS OF APPRAISAL

An appraisal of the newborn infant, to be adequate, should not be based on physical examination alone. It should involve also consideration of the socioeconomic background of the family; constitutional factors in the medical history of the family, especially the history of hereditary or transmissible diseases or defects; the prenatal history (the mother's pregnancy); and the natal and immediate post-natal history. Knowledge of the influence of these factors may tend to modify an examiner's appraisal.

The physical examination should be complete and should be supplemented by physical measurements, and, when indicated, by laboratory and roentgen-ray examinations. It should be repeated at least once during the first month, and more often if indicated by the history or by the development of some abnormal symptom. At the end of the first month of life another complete examination should be made.

SOCIOECONOMIC FACTORS

In the appraisal of the newborn infant socioeconomic factors play an important role which has not been sufficiently studied. That infant mortality is higher under poor socioeconomic conditions, such as low income, employment of mother, and congested housing, has been clearly demonstrated.¹

HISTORY

FAMILY HISTORY

It is of great importance to inquire into and record the family history of the newborn infant, because, as has been noted, the influence of inherited traits (constitutional factors) and of transmissible diseases or defects must be considered in the total appraisal of the infant. There are certain hereditary or familial defects and diseases which are obvious at birth, such as harelip and cleft palate, and others that are not apparent until the period of later infancy or childhood, such as Friedreich's ataxia, progressive pseudohypertrophic muscular dystrophy, and amaurotic idiocy. Developmental defects such as Mongolism may be obvious at birth; others, such as certain cerebral defects which result in convulsions and spastic palsies, may not become obvious until later. Certain sex-limited defects, such as color-blindness and hemophilia, are not apparent at birth, and therefore a knowledge of the family history should be taken into consideration in the appraisal of the infant.

¹ Causal Factors in Infant Mortality; a statistical study based on investigation in eight cities, by Robert Morse Woodbury. U. S. Children's Bureau Publication 142. Washington, 1925. 245 pp.

INFANT'S HISTORY

The history of the newborn infant consists of the prenatal history (mother's pregnancy), the birth history, and finally the immediate postnatal history, especially in regard to the onset of respiration.

Prenatal history.

The mother's health during pregnancy must be considered in relation to the maturity and weight of the infant and his adequacy for extrauterine existence.

The mother may have suffered during pregnancy from some disease which interrupted the pregnancy at some time before term or which may be transmissible to the infant. The most striking example of this is syphilis. That an infant infected by syphilis may be born prematurely or at term and with or without evidences of the disease is well known. Intrauterine transmission of almost any of the common communicable or infectious diseases, such as smallpox, chickenpox, and erysipelas, is possible. In fact, cases have been reported of infants born with typical scars of smallpox, as well as cases in which the acute lesions of the disease were present at birth. Erysipelas lesions in the infant may make their appearance within a few hours after birth if the mother is suffering from the disease. Tuberculosis, typhoid fever, and malaria have also been reported as transmissible to the fetus. On the other hand, the mother may confer on the fetus immunity to certain diseases, such as scarlet fever and measles. There are certain acute conditions in the mother, such as the toxemias of pregnancy, the effects of which on the fetus are not entirely clear. The infant is likely to be born prematurely, but studies have shown that if the infant is born alive at or near term no specific deleterious effects of the toxemia can be determined.

If the mother suffers from a deficiency disease the health of the infant may be affected. The outstanding example is thyroid disease in the mother resulting in cretinism in the infant. Women suffering with diabetes are likely to give birth to abnormally large infants.

There is some evidence that roentgen-ray therapy of the mother during pregnancy may result in injury to the central nervous system of the fetus (microcephaly).

In many instances the physical condition of the mother does not affect the infant, since normal infants may be born of diseased mothers. The history of the mother's pregnancy should, nevertheless, be considered in making the appraisal of the newborn infant.

The subject of immunity to disease in the neonatal period is an important one. The transmission of immune bodies and allergy from the mother to the infant has been rather extensively studied in recent years. It is well known that the antibodies of syphilis and tuberculosis may pass the barrier of the placenta and may be demonstrable in the infant's blood for weeks or even months after birth although the infant may be entirely free from infection. Likewise, immunity to scarlet fever, measles, poliomyelitis, and diphtheria in this period has been established.

Certain hormones that affect growth are probably transmitted to the fetus in the latter part of pregnancy. The therapeutic effect of such

hormones when given to prematurely born infants has been studied, but their value has not been accurately determined as yet.

Natal history.

When the course of the infant's birth is in any way abnormal, the effect on the infant may be apparent immediately or in the course of a few hours, or signs may appear at some period later in infancy and childhood which must be attributed to injury at birth. Of special significance are rapid or prolonged labor, dry labor, difficult delivery, instrumental delivery, and so forth.

Postnatal history.

The immediate postnatal history of the infant may be even more important than his natal history. Under ordinary conditions the respirations should start immediately and the infant's color should become good. If respirations are delayed artificial means to induce respiration must be used and the type and effectiveness of these methods must be considered in relation to immediate or remote effects on the organism. In this connection a history of any anesthetics and drugs given to the mother during labor must be known, particularly depressant drugs such as morphine and barbiturates. Appearance of cyanosis, pareses, paralyses, hemorrhages, twitchings, or convulsions in the immediate postnatal period, even if transitory, must be considered in making the appraisal of an infant that is apparently normal at the time of examination.

Fetal maturity.—After the birth of an infant the physician is at once confronted with the task of estimating its maturity. Since the exact date of conception is usually not known, calculations of the duration of pregnancy are ordinarily based on the date of the last menstrual period. The results of these calculations are often not accurate because menstruation may occur after conception takes place. It is usual to regard a fetus of less than 28 weeks' gestation as nonviable. When the time of gestation is estimated as between 28 and 38 weeks, the infant is called premature. When the time of gestation is estimated as between 38 and 40 weeks the infant is said to be mature. As a matter of fact it may be just as hard to draw a sharp line at the point where the "nonviable" fetus becomes a "viable" one as it is to set off sharply the "premature" from the "mature" infant.

A number of criteria are in use for the diagnosis of prematurity, none of which is entirely satisfactory from a scientific standpoint. Among them are (1) a birth weight of 2,500 grams (5 lb. 8 oz.) or less, (2) a crown-heel length of 47 centimeters (18.5 in.) or less, (3) relatively greater disproportion between head and chest circumference or head and shoulder girth than in the full-term infant, (4) an occipitofrontal diameter of the skull of less than 10 centimeters (3.9 in.), (5) a foot length of 7 centimeters (2.8 in.) or less, (6) roentgenographic evidence of absence of certain centers of ossification in the long bones.

Since two concepts are involved in any measurement of maturity—physical development and physiologic development—the exact period of gestation at which intrauterine life ends is a matter of legal or academic importance only. For clinical purposes, however, it is important that physicians recognize indications for special care and

that they have some basis for making a prognosis. The birth weight of the infant seems to be the best criterion from these points of view. In the first place weight is a measurement which is easily made and widely in use. Secondly, a background of statistics is available as to results of care in relation to birth weight. From clinical experience and mortality statistics it is clear that when the infant at birth weighs 2,500 grams (5 lb. 8 oz.) or less or measures 47 centimeters (18.5 in.) or less special care is needed. Moreover, statistics show that for infants weighing at birth 1,000 grams (2 lb. 3 oz.) or less survival is comparatively rare and that for infants above this weight at birth the chances of survival vary according to the birth weight. If the infant at birth weighs more than 1,500 grams (3 lb. 5 oz.) its chances of survival are four times as great as if it weighs 1,500 grams or less at birth. There are, however, some infants who according to weight or height or some other criterion should be capable of extrauterine existence and yet physiologically are incapable of such existence.

No rule should be laid down at present for determination of fitness for extrauterine existence, since the factors affecting viability are variable and not very well understood. "Immature" is a better term than "premature" to apply to infants who are physically or functionally unprepared for extrauterine existence.

The initial respiration.—Independent extrauterine life is not established until the infant breathes. Although the beating of the heart in the absence of respiration is evidence of life, it is merely evidence of persistence of intrauterine life. There is, moreover, evidence that the respiratory mechanism may function in utero, but the significance of this phenomenon is not clearly understood. Respiratory movements may occur when the head has been delivered and the body is still in the birth canal or immediately after separation from the body of the mother, or they may be delayed for varying periods, sometimes as long as an hour or more. Injury to an infant's central nervous system during birth or narcosis from anesthetics or such analgesic drugs as scopalamine, barbiturates, or morphine, administered to the mother during labor, may be a factor in delay of the onset of respiration.

Usually the infant at birth respires spontaneously and cries vigorously. When these physiologic processes do not occur at once it is necessary to take steps to induce respiration before the infant's heart stops beating. What is the best method to use is a debatable question. There is, however, agreement that, whatever method is used, the approach should be gentle and great care should be taken to keep the infant warm. Before any mechanical method is used the upper air passages should be cleared of mucus and other fluid by aspiration, through the use of a soft-rubber catheter attached to a negative pressure bulb. Following this, gentle rhythmic compression of the chest can be used, care being exercised not to squeeze the upper abdomen. Too violent compression in this region might raise intracranial pressure or rupture the liver. At the time that artificial respiration is being carried on inhalations of oxygen or of a mixture of 5 percent carbon dioxide and 95 percent oxygen may be given by various means, such as a mask or a nasal catheter.

The infant should under no circumstances be spanked, swung, or plunged into cold water; but, as has been mentioned, care should be taken to keep him warm throughout the time when attempts are being made to make him breathe.

Considerable variation in the rate and volume of respirations may occur in the newborn infant in the early days of life without pathologic significance, so far as is known. Even during sleep the respiratory rate may vary widely (16 to 93 per minute). The rate and volume are greater when the infant is awake than when he is asleep. There is a tendency, moreover, for the volume of inspired air to increase from day to day. On the other hand, marked change in the respiratory rate—slowing or accelerating—particularly if combined with increase or decrease in volume, should be regarded as evidence of some abnormal condition such as intracranial injury or acidosis.

A certain degree of atelectasis is physiologic after birth. It has been stated that this may be demonstrated by an actual measured daily increase in the circumference of the chest, as well as by roentgenograms made on successive days after birth, showing that complete expansion of the lungs is a gradual process taking place over a period of days or even 1 to 2 weeks. The physician's attention is drawn to atelectasis of an abnormal degree when the color becomes cyanotic or the breathing becomes abnormal or when physical signs are present in the chest, such as râles, impaired percussion note, or diminished or increased breath sounds. When atelectasis persists and seems of sufficient degree to cause symptoms it is usually secondary to some condition interfering with the normal functioning of the respiratory center or to some abnormal condition within the thorax such as a congenital defect in the circulatory system or persistence of undeveloped lung.

PHYSICAL EXAMINATION

A detailed and careful physical examination of the newborn infant can usually be made with safety shortly after birth. There is no contra-indication to making as complete an examination of a newborn infant as of an older infant if the conditions are satisfactory. Indeed, it is of the utmost importance that such an examination should be made of every newborn infant, since on the basis of the findings treatment may be instituted which, in many cases, may save the life of the infant. There is, moreover, a distinct advantage in making an examination of the infant as soon after birth as possible to be sure that the upper respiratory tract is clear, the color of the skin good, the cry vigorous, and respiration well established.

If the infant is immature and weak the immediate examination should be brief and made with as little exposure as possible. Further examination may be made after the infant's rectal temperature has become stable.

It is of particular importance that the examination of the infant should be made in a warm room, since the infant must be completely undressed. The room should be well lighted, as observation plays a very important role in the examination of any infant.

All methods used in the examination of an older infant may be used in the examination of a newborn infant. The smaller the infant the more care should be taken to apply all methods known for a detailed and careful physical examination. Procedures cannot, however, always be carried out in the usual order. It may be best to use the stethoscope first, while the infant is sleeping, and to use palpation or percussion later. If information is to be gained by these methods the physician's hand as well as the bowl of the stethoscope should be warm, and percussion and palpation should be gentle.

MEASUREMENTS

Weight.

The infant is usually weighed immediately after birth. The average weight of the full-term infant at birth is stated to be about 3,175 grams (7 lb.).

An infant weighing 2,500 grams (5 lb. 8 oz.) or less should be regarded as needing the care given to a premature infant, regardless of the history of the duration of pregnancy. Some infants weighing more than 2,500 grams may also require such care.

In appraising the infant, comparison of his weight with the weight of the average infant is of little value, as weight is affected by a variety of factors, chief among which are sex and race. Male infants tend to weigh more than female, and white infants tend to weigh more than colored. The gain in weight is the important consideration. The weight of a newborn infant usually decreases in the first 3 to 4 days. This loss in a full-term infant is about 6 to 9 percent of the weight at birth. The birth weight is ordinarily regained between the tenth and fourteenth days. During the neonatal period after the first few days the average gain is at the rate of 30 grams (1 oz.) or more per day.

Skeletal growth.

Certain measurements of the infant should be made within 24 hours after birth because they are important from the point of view of determining maturity and also because they serve as a base line in respect to growth. These measurements should be accurately made and recorded. The important ones are as follows:

Crown-heel length.—The crown-heel measurement should be made with the infant flat on his back and extended. A measuring board or a metal anthropometer should be used. Measurements of the total length made by tape, with the infant hanging by the feet or even in a prone position, will obviously be inaccurate.

The average length of the full-term infant is usually stated to be 50.8 to 53.3 centimeters (20–21 in.). Length, like weight, is affected by various factors, such as race and sex. Growth in length during the neonatal period has not been satisfactorily studied.

Head circumference.—The occipitofrontal circumference of the head should be measured with a *steel* tape 24 to 48 hours after birth; this measurement should be made on the third or fourth day of life, since considerable edema of the scalp and molding of the skull are frequently present at birth. It is important to have this measurement recorded, as abnormal size of the head or abnormally rapid

growth of the head or disproportion between the head and shoulders or the head and chest has important clinical significance. The average circumference of the full-term newborn infant's head is 34.8 centimeters (13.7 in.). The head circumference should be considered in relation to the length. The head grows relatively rapidly, and the circumference at each age period is equal to approximately one-half the body length plus 10 centimeters (3.9 in.).

The occipitofrontal diameter of the head is a measurement that has been found to be closely related to weight. It may be used as a measure of maturity; a diameter of 10.5 centimeters (4.1 in.) or less is said to indicate prematurity. Calipers are necessary to make this measurement.

Measurements of the circumference of the thorax, shoulders, and abdomen are not easy to obtain accurately and are therefore of relatively little value in determining the degree of prematurity.

It is probable that some measurement of width should be made (the bi-iliac or bitrochanteric diameter, for example) to use in relation to crown-heel length in estimating the nutritional status. No indices have been worked out, however, for infants in the neonatal period.

TEMPERATURE

Immediately after birth the temperature of the infant is said to be slightly higher than that of the mother. In the next few hours it drops $1\frac{1}{2}$ to 2 degrees and it has a tendency to remain low during the first day. The body temperature of the newborn infant is easily altered by changes in the environment and therefore even the normal full-term infant should be spared exposure and variations in the temperature of the environment.

GENERAL OBSERVATIONS

It cannot be too much stressed that ample time should be given to careful observation of the infant. Special attention should be paid to his color, the movements of his arms and legs, the ease with which he can be awakened or made to cry, the type of the cry, and his ability to suck. Observations should be made when the infant is asleep, or at least quiet, and again when he is awake or crying. The order in which the rest of the examination is carried out depends upon the state of activity or inactivity of the infant. When the infant is asleep is an opportune time to listen to the heart and lungs and to test the reflexes, as resumption of activity or crying makes these examinations difficult. On the other hand, the deep respiration during crying is of inestimable value in auscultation for the detection of râles.

Activity.

Normally a newborn infant remains asleep throughout the greater part of the day, but it is with difficulty that any part of a procedure requiring actual handling can be carried out without waking him. An infant is normally more active when hungry than after a recent feeding. He resists any attempt to change his posture, as well as any restraint of free motion of the head or extremities. Crying

is usually accompanied by vigorous movements of the arms and legs. Sudden noises or sudden change in body posture will often elicit in the normal infant a clonic flexion of the arms and legs (Moro reflex). A normal infant will remain awake throughout the examination while being handled, and if recently fed and comfortable will soon return to sleep when the examination is concluded.

The activity of the infant has great significance. The mature infant should cry when stimulated, maintain this cry for at least a few minutes, vigorously move the arms and legs, and then gradually settle back to sleep again. Difficulty in waking the infant and in making him cry and a feeble or poorly maintained cry are indications of the presence of some abnormality such as immaturity, atelectasis, narcosis, or intracranial lesions.

Posture.

The newborn infant lies with the head held to the right or the left and resists strongly any attempt to change this position of the head. (See Magnus reflex, p. 18). Usually, however, the head will be turned to one side when the infant is sleeping, and it will acquire a midline position when he is crying.

The newborn infant lies on the back with the arms and legs slightly flexed. There is normally slight outward rotation of the legs at the hips, and the legs tend to assume the same position both when the infant is awake and when he is asleep. The arms may assume varied positions when the infant is asleep. It is important to turn the infant over so that the back may be examined. The symmetry of bony points, such as scapulae, hips, and vertebrae should be noted. At birth two vertebral curves are present, a dorsal and a sacral, each convex posteriorly. The cervical and lumbar curves are not established until the infant is old enough to stand.

If the newborn infant is held upright and supported under the arms and the feet are brought in contact with a smooth, hard surface, he will tend to straighten the legs, flatten the feet, and bear a little weight on them; sometimes one leg and then the other will be raised and flexed as if making walking movements. When he is placed on his abdomen he usually makes an effort to raise his head. Frequently the newborn infant is able to raise his head well off the examining table and sometimes to maintain this posture for several minutes.

Special senses.

The special senses of the infant and the response to various stimuli have been studied to some extent. As is known, the infant can see light.

The sense of smell is probably present from birth. Observations of this sense in newborn infants are few and are not altogether conclusive.

The newborn infant is said to be deaf at birth and for several days thereafter. In the neonatal period infants vary greatly in their response to auditory stimuli, some starting at sudden or loud sounds, others not reacting to them. The testing of hearing is difficult in infancy.

Tactile and thermal sensibility and the sense of pain and of taste are all present at birth.

Crying.

It is important to determine the tone and strength of the cry. Most normal newborn infants cry during part of the examination. If the infant is hungry there will be a tendency to crying throughout the greater part of the procedure. If he has just been fed and is well satisfied it may be necessary to stimulate crying by gently snapping the soles of the infant's feet. If during the examination the infant cannot be made to cry or if the cry is feeble, shrill, difficult to elicit, or not maintained, it should be considered abnormal. A crowing cry, not accompanied by any signs of laryngeal obstruction such as cyanosis or retraction of episternal or suprasternal notch, is probably evidence of so-called congenital laryngeal stridor. It is attributed to looseness or redundancy of the vocal cords and has no pathologic significance. It usually disappears in a few weeks but may persist for several months. Tetany, and possibly enlargement of the thymus gland (very rarely) as causes of the crow should, however, be considered.

Yawning and coughing.

It is seldom that the newborn infant yawns or coughs. If he is examined before respiration is well established there may be gagging and vomiting of mucus or gastric contents, accompanied by irregular and difficult breathing. Hiccoughing and sneezing occur rather frequently in the normal infant.

Sucking.

Sucking is a well-developed reflex present in the infant at birth. Even after a sufficient feeding, sucking movements are stimulated when the nipple is placed in the infant's mouth. Absence or poor development of the sucking reflex indicates immaturity or the presence of some other abnormal condition such as intracranial lesions or narcosis.

SKIN

The skin of the newborn infant at birth is covered with vernix caseosa; the amount varies considerably. After the initial cleaning with oil the skin is normally moist, soft, and elastic. Pigmentation varies with the race of the infant and in the darker-skinned races may be deeper on certain localized areas, especially over the genitals, at the base of the nails, and around the areola of the nipples. Bluish pigmented areas, the so-called Mongolian spots, are frequently found on the back, buttocks, or extremities of infants of certain races, notably Italian, Jewish, Negro, and Oriental. The newborn infant's subcutaneous fat is well distributed and gives to the skin of the normal infant a soft, elastic feeling. The general color is normally a bright pink and in the dark-skinned infant is best seen by observing the palms, soles, nails, and mucous membranes. Physiologic jaundice is seldom observed during the first 24 hours of life. Coarse desquamation is sometimes present during the first 2 to 3 days of life. The hair of the scalp is present and varies in amount and length. It is fine or moderately coarse and usually is straight. The eyebrows are present, but in infants with light hair they may be difficult to see. The fingernails are normally well formed and often extend to or beyond the fingertips. The toenails are subject to great variations in size and shape, are often small, and appear embedded at the distal end.

LYMPH NODES

The various groups of lymph nodes are very frequently palpable in the newborn infant, especially if the subcutaneous fat is small in amount. Only when the nodes are definitely enlarged should they be considered abnormal. The groups of nodes most frequently palpable in normal newborn infants are as follows, in order: Inguinal, axillary, epitrochlear, posterior cervical. The anterior cervical, occipital, posterior auricular, and anterior auricular nodes are not palpable as a rule.

HEAD

The variation in the shape of the head due to molding may be very great in the first 24 hours. In some infants such changes are completely absent and in others they are very marked. The point of greatest molding may be asymmetrically located and may give the head a true asymmetry. Changes due to molding disappear rapidly and are usually gone in 24 to 48 hours, but may last much longer. The parietal bones normally are smoothly convex and slightly prominent. The forehead is usually on a horizontal line with the face but may be slightly prominent or slightly receding. The scalp should overlies the bones of the head closely and the bones should be firm. Careful palpation of the head is important, as edema, caput succedaneum, cephalhematoma, or defects in the skull bones, which are not obvious on inspection, may be present.

The principal sutures are: The sagittal or longitudinal; the coronals, which separate the frontal bone from the parietal bones; and the lambdoids, which separate the parietal bones from the occipital bone.

Great variation is found in the sutures in the newborn infant's skull; they may be overlapping, approximated, or gaping. Usually the bones at the edges of the sutures feel hard, but they may occasionally feel soft or thin or be movable. Within 24 hours after birth a suture that was overlapping at birth may become gaping. In hydrocephalus all the sutures are found to be gaping.

There are many fontanels, but the most important clinically are the anterior and posterior. The examination of the anterior fontanel is very important. There is a great variation in the size of this fontanel. It may be large enough to admit four or even five fingers in its anteroposterior and lateral diameters, or it may be so small that it is barely palpable, or even not palpable, on account of overlapping of the sutures. A wide-open fontanel may be impossible to measure because anteroposterior and lateral angles run into open sutures. The size of the anterior fontanel is usually of no significance if the tension of the fontanel is normal. A fontanel that is level with the surface of the skull or somewhat depressed is normal.

The posterior fontanel may be just palpable or may be widely open, but no clinical significance should be attached to the size of this fontanel when considered alone.

The parietal fontanel is a small fontanel situated about half way between the posterior angle of the anterior fontanel and the posterior fontanel. In many newborn infants it may be barely palpable or it may admit the fingertip. It has no clinical significance but is merely a developmental point in the growth of the skull.

There are a number of other fontanels which are not normally palpable, such as the mastoid and the sphenoidal.

Eyes.

When the physician examines the newborn infant on the day of birth, a solution of some silver salt has usually been instilled into the eyes, making the examination of them difficult. There may be a mild conjunctivitis, or a severe one with edema of the upper and lower lids and photophobia or even some purulent discharge. The possibility of gonorrheal infection must be kept in mind. These very acute symptoms, which are nonspecific, should disappear within the first 24 hours, leaving merely an injection of the palpebral conjunctivae. A mild inflammatory condition may persist for several days in spite of treatment. The tear duct or ducts may not be patent at birth, but this condition is usually remedied spontaneously.

The infant may stare fixedly or turn the eyes suddenly from one side to the other. A transient strabismus of one or both eyes is frequently seen. A few coarse lateral jerkings suggesting nystagmus are occasionally seen in the normal infant.

The pupils vary considerably in size from time to time and react very readily to light. It is important to note the reaction of the pupils and whether they are equal in size. Observations should be made with the light thrown with equal intensity into both eyes. Inequality of pupils or differences between them in reaction to light have important significance in relation to the central nervous system. After the photophobia of the first day or two the eyes do not seem to be especially sensitive to light, but the normal infant will wink if the light is brought close to the eyes.

Sight is difficult to determine in the neonatal period but perception of light can be determined readily, as described above.

Jaundice of the sclerae is seen in the majority of infants between the second and tenth days of life, a manifestation of the physiologic jaundice characteristic of the newborn period.

Frame-like subconjunctival hemorrhages are seen in so many infants in the first 3 days of life that although not normal they are more or less physiologic and are probably not significant except as evidence of changes in vascular tension during the process of birth. They disappear rapidly and completely.

No great difficulty should be encountered in examining the eye grounds of a newborn infant with an ophthalmoscope. If the infant is wrapped tightly and given a bottle of water or milk he will often open his eyes and hold them quiet for a considerable time, even when a strong light is reflected into them. Sometimes, and too often, of course, only transient glimpses of the disk can be obtained. The normal disk of the newborn infant is pale and sharply outlined. Small hemorrhages are frequently seen, which are evidence of increased intracranial pressure during delivery and are apparently of no pathologic significance unless other symptoms pointing to birth injury are present. Failure of the pupils to react to light is probably an indication for an ophthalmoscopic examination, for blindness may be due to retinal defects that will entirely escape notice unless ophthalmoscopic examination is made.

Nose.

The nose of the newborn infant is relatively small and flat. At the time of the onset of respiration the nares should be cleared of any secretion. Small whitish-yellow spots are often seen in the skin over

the tip of the nose. They are follicles of the skin filled with sebaceous material and they disappear spontaneously.

Ears.

The external and internal parts of the ear are well formed at birth. The drums may be retracted until the Eustachian tubes open. The surface of the drum forms an obtuse angle with the external auditory canal. If this angulation is appreciated and the otoscope tilted accordingly, examination is possible and the landmarks of the drums can be clearly made out. Otitis media is not unknown even in the first few days of life.

Mouth.

The lips should be red and smooth, but may show puckering and even desquamation of a coarse type apparently due to trauma from sucking.

The gums are smooth and pink and frequently show slight puckering or even grooving at the distal margins. Frequently small gray cystlike bodies are found, especially in the upper gums. When the infant cries the lips are drawn back symmetrically so that the nasolabial folds are equal. Rarely one or two teeth are present at birth.

The soft and hard palates and the uvula are well formed. There is often considerable variation in the width and in the height of the palate. In the midline of the hard palate whitish or yellow glistening raised spots may be seen, the so-called Bohn's nodules. They mark the fusion of the halves of the palate.

The tongue should be moist, smooth, and symmetrical. Fine fibrillary waves may be noted passing down over the sides of the tongue when it is extended during crying. The tongue should not normally be seen extending between the lips or protruding beyond them.

The buccal surfaces should be smooth and pink and usually the openings of Stensen's ducts are easily seen.

Throat.

Examination of the throat of the newborn infant is difficult because as soon as the tongue is touched with a tongue depressor the infant will make such strong sucking movements that the tongue cannot be depressed. In order that the examiner can see the throat satisfactorily the infant should be made to cry or should be gagged by the introduction of the tongue depressor. A good light should be thrown directly into the throat. The examination will be more satisfactory if an assistant holds the infant's head tipped back and straight in the midline. On the first day the throat will often appear red. This is due to trauma caused by the wiping out of mucus after delivery and perhaps to lack of fluids. The tonsils are not visible in the neonatal period, although occasionally there is a slight follicular appearance as if little bits of lymphoid tissue were present in the fossae. The voice should be clear and strong.

NECK

The newborn infant usually lies with the head turned on one side. The infant resents changes of this posture but there should be no actual stiffness of the neck when the head is turned from side to side or when the head is flexed on the chest.

The sternomastoid muscles are well developed and should be smooth and equal, with the head in the midline. When the head is turned from one side to the other the muscle on the side opposite that to which the head is turned becomes more prominent. The muscles should be palpated, as hematomata in these muscles are common as the result of trauma at birth. They are frequently not diagnosed until calcification takes place. Their only significance is that in an occasional case permanent torticollis results. This can usually be prevented by postural treatment.

The thyroid gland is not normally visible or palpable.

CHEST

The chest is normally well rounded (barrel shaped), although the contour may vary considerably. The costal angle is usually 90° or more.

Mammary glands.

Enlargement of the mammary glands is not present normally during the first day of life but sometimes appears in the early neonatal period even in male infants. The enlargement may be unilateral or bilateral. The breasts may contain a milky fluid. Manipulation should be avoided because of danger of infection; no treatment is necessary for this type of enlargement of the breasts.

Thymus gland.

The relation of the thymus gland to the well-being of the newborn infant is a matter which has been the subject of a vast amount of speculation and investigation.

Pathologic studies have shown a close relationship between the weight of the infant and the size of the thymus gland. The well-nourished infant has a relatively large thymus gland while the poorly nourished infant has a relatively small one. Any symptoms or clinical findings pointing to an enlarged thymus should lead to roentgenographic examination (see p. 19); but in the light of our present knowledge, treatment of an "enlarged" thymus gland by roentgen ray is justified only if symptoms are present that are regarded as characteristic of an enlarged thymus gland and that cannot be otherwise explained.

Lungs.

Respirations are chiefly abdominal in type. The rate and depth of the respirations are extremely variable, even in sleep. Light percussion produces normal resonance over the entire lung areas. Auscultation reveals bronchovesicular breathing of equal intensity over the corresponding areas of each side, without râles. The expiratory phase is longer and louder in the newborn than in the older child or the adult.

Heart.

Three points should be borne in mind when examining the heart of a newborn infant: The variability in the heart rate, the difficulty in determining the size of the heart, and the frequency of murmurs.

The heart rate of the new born infant is rapid and varies greatly with the phases of respiration and with crying and also with sleeping and waking (80 to 160 per minute). At times a very marked

bradycardia and again a very marked tachycardia may be found. These variations are merely manifestations of the instability or immaturity of cardiac regulatory mechanism and apparently have no significance unless they persist or recur.

The apex beat can be felt, well localized in the third and fourth interspaces, about 3 centimeters (1.2 in.) to the left of the sternal margin. Percussion of the borders of the heart is probably not worth while, since information obtained by this method is even less reliable in the infant than in the adult.

The heart sounds should be clear and distinct, the second being nearly equal in intensity to the first, giving the so-called "tick-tock" rhythm.

Murmurs in the heart occur frequently in the neonatal period. They may be present at birth, disappear, and reappear. The intensity of the murmurs may vary greatly from time to time. Differentiation between murmurs that have a pathologic significance and other murmurs is sometimes difficult. A final opinion probably should be reserved until repeated examinations can be made. The change from fetal to independent circulation is abrupt, but the functional as well as the organic closure of the fetal openings is not abrupt but gradual. No doubt many murmurs heard in the early days and weeks of life are explained by the persistence of these fetal openings or by pleuropericardial friction.

ABDOMEN

The ease with which the abdominal viscera can be palpated in the newborn infant may lead to wrong interpretations if the relative size and position of the organs are not known.

Liver.

The edge of the liver is usually palpable, and the distance below the costal margin should be carefully noted because increase in the size of the liver may be a significant point in later diagnosis.

Spleen.

The spleen can often be felt in infants that are apparently normal. As with the liver, an increase in the size of the spleen has more significance than mere palpability.

Kidneys.

The kidneys are easily palpable in most newborn infants, the lower poles lying at about the level of the iliac crests. The left kidney is usually lower than the right.

Umbilicus.

The condition of the umbilicus should always be noted, as at this point infections as well as abnormal persistence of fetal conditions may first be noted. The cord stump ordinarily drops off at about the fifth day, leaving a dry scab or scar. A hernia often is suspected when the stump is prominent but should be diagnosed only when bulging takes place during crying and when there is also a palpable defect in the abdominal wall in that region. Mild infection of the umbilicus is manifested by a slight discharge resulting in a granuloma; more severe infection, by redness and purulent discharge and occasionally by enlargement of the blood vessels.

Certain structures may occasionally be felt in the newborn infant's abdomen which represent persistence of fetal structures and may or may not have pathologic significance. The urachus, which represents the portion of the allantoic duct between the bladder and the umbilicus, may persist as a whole or in part. If it persists as a complete tube, urine may escape through it at the umbilicus. Fistulae at the umbilicus may, of course, be caused by persistence of the omphalomesenteric duct.

GENITALIA

The penis of the newborn male infant varies considerably in size and length. The foreskin is usually adherent to the glans and may be somewhat difficult to retract. The physician will have to decide whether forcible retraction, stretching, or circumcision is indicated, according to the findings. If phimosis is marked and is untreated the infant may have difficulty in voiding. The scrotum varies considerably in size from time to time. The scrotal tissue may, during the first day or two, contain a moderate amount of fluid, probably edema due to trauma and congestion during delivery, especially breech delivery. This condition is not a true hydrocele. The testicles should be palpable in the scrotum, but if the infant is slightly chilled or if he is active they may ascend toward or into the external inguinal ring. The testicles are usually quite small, firm, and of equal size, although asymmetry is sometimes observed.

The labia of the newborn female infant are usually prominent. The labia majora are not so close together as in the older child, and the labia minora are relatively large. When the labia minora are separated a white mucoid discharge is sometimes seen, which may be profuse in the first day or two. Slight bleeding may occur in the first few days of life, which, if unassociated with bleeding elsewhere, may be considered physiologic. The margin of the vagina may show a skin tag which requires no treatment. Sometimes a small cyst is seen closing the opening (hymenal cyst).

ANUS

The anal opening normally is closed tightly by the external sphincter. The mucous membrane is smooth and is free from venous engorgement, except in infants delivered by breech. In these cases submucous hemorrhages may be found at the mucocutaneous junction of the anus.

JOINTS, BONES, AND MUSCLES

Joints.

It is important to examine the infant's joints by inspecting them and trying out their function. By abducting the arm, the head of the humerus can be easily palpated in the upper axilla. Full extension of the elbows, knees, and hips is often difficult in the newborn infant, probably because the normal intrauterine position is one of flexion at these points. Flexion at the hips will be most marked in infants born by breech, and in these infants complete extension at the hips will be nearly impossible in the first 3 or 4 days. The great trochanter of the femur should be felt for on each side, and the leg should be rotated and abducted to determine whether the head of the trochanter is in the acetabulum. The contour of the buttocks and the level of

the gluteal folds should be carefully noted, as any asymmetry may indicate dislocation of the hip joint. Each extremity should be handled to see that function and muscle tone are normal.

Bones.

The clavicles are the first bones to be ossified and are the bones most often fractured during delivery. Fractures, however, will often be missed unless the clavicles are felt throughout their length. In an infant with a broken clavicle the stimulation of a sharp blow on the examining table, which ordinarily results in the so-called Moro reflex, fails for the arm on the side of the broken clavicle.

In examining the extremities the length and smoothness of the underlying bony structures should be observed. The skull also should be carefully palpated.

The vertebrae are occasionally broken during delivery. Palpation of the spine, especially in the cervical region, should be done, particularly after long and difficult labor and if the infant's respiration is not normal and the pupils are unequal.

Muscles.

The muscles of the extremities and of the abdomen should be palpated. Those of the extremities can be tested by pulling on the legs when flexed and palpating them when extended. Inequality of pull or tone should be tested for. Abdominal tone can be tested by palpation when the infant cries.

TESTS FOR REFLEXES

The clinical interpretation of the reflexes of the newborn infant requires very special consideration. There are many conflicting statements in the literature, due partly to differences in technique used for testing the reflexes but largely to lack of appreciation of fundamental conceptions of the development of the nervous system. Recent work has led to a conception that explains the variability of responses: namely, that the response to a specific stimulus is generalized and that specificity of response increases as a result of developmental and environmental factors, or both. Variations in response will be found, moreover, to depend upon the degree of activity or inactivity of the infant at the time when the tests of reflexes are made. In most reports no statement is made as to whether the infant was awake or asleep, or whether he was quiet, active, or crying. Standards for interpretation of reflexes have usually been based on tests made on an insufficient number of cases.

The following reactions to light are present at birth: Contraction and dilatation of the pupils, consensual pupillary reflex, corneal and conjunctival reflexes. The sucking and swallowing reflex is usually well established. Certain other reflexes should be tested for as a routine. Whether they are found present or absent in a normal newborn infant depends a good deal on the activity of the infant and the skill and patience of the examiner.

Chvostek sign.

Tapping the facial nerve in the cheek, especially if the infant is asleep, will frequently elicit the Chvostek sign, which usually has no clinical significance in the neonatal period. This response must be

differentiated from the mouth jerk that is obtained in an even larger number of sleeping infants in the form of a sudden pursing of the lips, which also has no clinical significance. By tapping the face a head-and-jaw jerk may be also found.

Abdominal reflexes.

The abdominal reflexes are easily obtained in the normal newborn infant when he is quiet, but cannot be obtained as a rule when the infant is active. These reflexes are very lively, even in the immature infant.

Knee jerks.

Knee jerks can be obtained in all normal newborn infants. There is great variability in the normal response, ranging from sluggish to hyperactive. Occasionally when the tendon of one knee is tapped there is a reflex response of the other leg. This is found usually in a sleeping infant and occasionally in an infant who is awake but not very active. The arm jerks (of triceps, biceps, and periosteoradials) are usually more difficult to obtain.

Ankle clonus.

The presence of an ankle clonus does not mean that the infant is abnormal unless it is accompanied by other signs or symptoms of disturbance of the central nervous system. Clonus that is not sustained or only moderately sustained (3 to 5 jerks) is frequently found in the newborn infant, especially if the test is made when the infant is quiet. When the clonus is sustained (10 to 12 jerks or continuous jerks) it usually has a pathologic significance, especially if accompanied by other symptoms.

Moro reflex.

Rapid rhythmic shaking of the arms and legs may occur spontaneously or may be brought on by suddenly rousing the infant or by jarring him by striking the fist on the hard surface of the table on which the infant is lying during the examination—the so-called Moro reflex. This reflex movement is a normal response and may occur during the first 2 or 3 days of life or even later. It has been shown that if after such stimulation symmetrical clonic movements of the arms do not occur this points to abnormality on the side on which the response does not occur. For example, if the clavicle is broken on the left side the left arm is kept close to the side while the right arm responds normally with a rhythmic or clonic shaking. The same type of jerking may occur spontaneously in the lower jaw or may be precipitated by depressing the jaw forcibly to examine the inside of the mouth and the throat.

Magnus reflex.

To test for the Magnus or tonic neck reflex rotate the head of the infant forcibly to one side. A normal newborn infant occasionally responds to this test by rotatory movements at the shoulders. The positive response to this test, which occurs only in the presence of a lesion of the central nervous system, is flexion of the arm on the same side and extension of the leg on the opposite side.

Cremasteric reflex.

The cremasteric reflex is present in the newborn infant. The movement of the testicle frequently cannot be seen in the first few days because of edema of the scrotum.

Response to plantar stimulation.

Because of the extreme sensitivity of the sole of the newborn infant's foot response to plantar stimulation is difficult to interpret. The reaction is usually a violent withdrawal. If the ankle is grasped firmly and a blunt object drawn from the base of the great toe to the other side of the heel the usual response is dorsal flexion alternating with plantar flexion; there may be no definite response. The Babinski sign has therefore little significance at this period of life.

Adductor spasm.

Adductor spasm should be tested for by grasping the knees, holding the legs extended, and abducting them. In the first few days of life a certain amount of adductor spasm is found, which gradually disappears.

OTHER TESTS**Laboratory tests.**

Almost all the laboratory methods that are used for diagnosis in older children can be applied to the newborn infant. It is necessary, however, in some instances to make further refinements in technique for the application of the methods to very small infants.

Roentgen-ray examination.—The roentgen ray may be used as freely in the examination of the newborn as of the older infant, as an aid in diagnosis of pathologic conditions of the chest, including thymus, lungs, and heart, and of the gastrointestinal, genitourinary, and osseous systems. Frequently roentgen-ray examination is postponed or is not thought possible because of the relative lack of vigor of the newborn infant, but sometimes delay in its use results in loss of life. Since the use of the roentgen ray should become a common aid in the appraisal of the newborn infant, it seems worth while to give a somewhat detailed outline of its possible use in this period.

With the introduction of roentgenograms interest in the thymus gland was greatly stimulated, but because of the great variability in technique and in the interpretation of results much of the data gathered in the past are now known to be of relatively little value. Examination of the chest by means of the fluoroscope often gives valuable information in regard to the differential diagnosis of shadows in the mediastinum. When enlargement of the thymus gland is suspected roentgenograms should be taken in the lateral as well as the anteroposterior position, as in this way evidence of pressure of the thymus gland on the trachea may become apparent.

Considerable doubt has arisen as to whether abnormal clinical signs, or death, are ever attributable to enlargement of the thymus. However, there are instances in which the evidence that this gland plays a role is so strong that the best point of view to take at the present time seems to be that treatment with the roentgen ray should be given only if there is no other explanation of symptoms.

Roentgen-ray examination of the lungs of the infant in the neonatal period will sometimes reveal changes entirely unsuspected on physical examination. The interpretation of findings in this field is difficult, because of variations in technique used by different observers and because of the many changes in shape of the chest and density of the lung tissue due to expansion and growth of the chest during the first few days and weeks of life.

A certain degree of atelectasis is physiologic shortly after birth, as may be demonstrated by roentgen ray.

Roentgenograms of the heart of the newborn infant are difficult to interpret because the mediastinal shadows may partially obliterate the true outline of the heart and because of the technical difficulties met with in obtaining satisfactory films. However, gross deviations from the usual size can be made out from films taken with the infant in the prone position. The variation in the shape of the heart shadow that occurs in certain types of congenital heart disease may be a real aid in diagnosis.

The employment of the roentgen ray is important in the early diagnosis of congenital anomalies of the gastrointestinal tract. Certain of these anomalies are amenable to correction. Delay in making the diagnosis is a great factor in the high mortality from surgical procedure. Opaque substances may be used to define the tract, but will obviously be a handicap if operation must be performed.

Roentgenographic examinations of the bones in the neonatal period give important information from the physiologic as well as the pathologic point of view. Fetal maturity can probably be gaged fairly accurately in this way. The earliest signs of syphilis can often be seen in roentgenograms of the bones, and occasionally evidences of rickets can be found in this way. Cases of congenital rickets demonstrated by roentgen ray have been reported in infants whose mothers were suffering from osteomalacia. Fractures of bones, due to trauma of delivery or to pathology in the bone, may be seen by roentgen ray when unsuspected clinically. Congenital absence of certain bones and occasionally other anomalies may also be so diagnosed. Incompleteness of ossification makes the roentgen-ray diagnosis of congenital bone defects difficult, especially when joints are involved, as in dislocation of the hips.

Some idea of brain pathology in the newborn infant can be obtained from roentgen-ray examination of the skull by noting the width of the sutures, the appearance of the convolutional markings and the thickness and uniformity of ossification of the cranial bones. Encephalography and ventriculography may be done in selected cases.

The development of the vertebrae has been described by anatomists, but little information is available with regard to the roentgenographic examination of the spine of the newborn infant. Obviously, when any abnormality of the spine is found on clinical examination roentgenographic examination should be made.

Examinations of blood.—Fundamental to an interpretation of the findings in the blood of the newborn infant is the conception that the change from intrauterine to extrauterine life, with establishment of independent circulation, brings about readjustments in the physiology of the infant which are especially marked in the blood. Estimations of the number of cells, amount of hemoglobin, and so forth, have been found to vary widely with different observers. This variability in reports is probably due to several factors, among the most important of which are differences in technique of examination and variability in the time at which the examination was made. Cognizance must be taken of changes in the blood from day to day and from hour to hour.

The number of red blood cells of the infant at birth varies widely (from 4 to 7 million per cubic millimeter), with a definite tendency to range above the 5 million accepted as normal for adults. Shortly after birth, however, because of increasing oxygenation of the blood with the establishment of respiration, a rather rapid reduction in the number of red blood cells takes place and continues during the first week or 10 days. As a result of this destruction of red blood cells, blood pigment is freed and deposited in the organs. For this reason jaundice is found in varying degrees in most newborn infants, appearing on the second or third day and disappearing usually before the tenth day. This is a physiologic jaundice, the so-called *icterus neonatorum*. During the remainder of the neonatal period and for a few weeks afterward the number of red blood cells continues to decrease, though at a less rapid rate. The lowest count (3.3 to 5.0 million) is reached at 6 to 12 weeks, after which there is usually a tendency to rise slowly.

The hemoglobin content of the blood also is high at birth and parallels the red blood count closely but shows a tendency to be relatively higher in the first 2 months of life. At the end of the second month the hemoglobin should read approximately 13 grams per cc of blood and the red blood cells should number about 4 million per cm of blood.

In the blood of the mature infant in the first few days of life 1.25 percent of the red blood cells may be nucleated. In the premature infant these nucleated cells may be found in larger numbers and persist longer.

The reticulocytes, which number approximately 3 percent at birth, fall rapidly to 0.17 percent through the first 7 days, after which there is little variation during the neonatal period. The platelet count has been reported by one set of observers as relatively low at birth (mean value 227,000) and to rise gradually throughout the neonatal period until at 2 months the mean value is approximately 325,000. Another report gives the platelet count as approximately 500,000 at birth, with relatively little change throughout the neonatal period. In the former studies blood was obtained by skin puncture; in the latter, by venipuncture. The bleeding time at birth is from 30 seconds to 3 minutes (Duke method), the coagulation time (fine capillary tube method) from 2 to 4 minutes.

The total white blood-cell count varies greatly in the neonatal period and is particularly unstable at the time of birth. As late as the end of the first week the count in normal infants has been found to vary between 5,000 and 20,000 cells per cubic millimeter. Knowledge of the differential count in the neonatal period is of particular importance. At birth the polymorphonuclear-leucocyte count predominates over the lymphocyte count. Between the sixth and ninth days the number of the two types of cells tends to become equal, but by the tenth day the lymphocytes predominate, and this ratio persists throughout the neonatal period. Immature cells are frequently found.

The blood culture as a means of diagnosis has been greatly neglected. When, without obvious cause, an infant fails to thrive or has fever or some other symptom, the blood culture is one of the most important tests that should be made.

Serologic tests for syphilis must be interpreted with care, since the complement-fixing antibodies may pass the placenta and appear in the infant's blood without actual infection of the infant. A positive Wassermann reaction of the mother's blood therefore does not necessarily mean infection of the infant. A positive serologic reaction of the infant's blood has the same significance in newborn infants as in older ones if this reaction is still present after the second or third month of life, particularly if the results of quantitative tests become stronger. If clinical or roentgen-ray evidences of syphilis are present, however, a positive serologic test at any age should be interpreted as confirming the diagnosis.

Isoagglutinins and isohemolysins are present in the blood of the newborn infant in a large enough number of cases to make it advisable to carry out compatibility (typing and matching) tests before blood transfusions are undertaken.

The chemistry of the blood of the newborn infant has been studied to a considerable extent. Not all the standards that have been established for adults have been established for newborn infants, since the number of cases studied has, as a rule, been somewhat meager. It is important to know, however, that the standards for the calcium and phosphorus content of the blood have been satisfactorily established for the neonatal period.

Examination of urine.—Examination of the urine is too often neglected. Routine urinalysis should always be done when fever, even if slight, is present. The finding of pus in the urine of an infant in the neonatal period should always suggest infection and, especially in a male, may point to the presence of a congenital anomaly of the genitourinary tract. If the diagnosis of congenital defect is made early, correction of the defect may in certain cases prevent the development of more severe and sometimes fatal infection.

The urine of newborn infants should be observed for blood and bile, since the presence of either of these usually is of serious significance. In the first 3 or 4 days of life light pink stains may be found on the diaper, due to undissolved uric-acid crystals; these are of no significance.

Examination of stools.—The stools of newborn infants should be observed carefully. The time of the first passage of meconium, the color of it, and the transition from meconium to soft yellow stool should be noted. The presence of gross blood or the absence of bile (white stools) is of special significance in the neonatal period because either one may be the first indication of some abnormal condition peculiar to this period of life. If there is any question as to the presence of bile or blood, laboratory tests should be made.

Examination of spinal fluid.—The importance of examination of the spinal fluid in the newborn infant and the safety and ease with which it can be withdrawn by skilled operators even in the smallest infants if the proper technique is used has been pointed out by several investigators. On the other hand, there is some disagreement as to whether or not lumbar puncture should be done in the presence of increased intracranial pressure, as in hydrocephalus and hemorrhage. Moreover, since there is also some question as to interpretation of findings with regard to the fluid, spinal puncture should

be done only after careful consideration of the indications. If fresh blood is present it may be the result of trauma from the lumbar-puncture needle and is not necessarily evidence of intracranial hemorrhage. Yellow spinal fluid (xanthochromia) may be evidence of the presence of old hemorrhage or staining with bile. The tension under which the spinal fluid flows gives evidence of the intracranial pressure and should be considered in connection with the different types of hydrocephalus and hemorrhage.

In the rare cases in which meningitis is suspected lumbar puncture should be done for diagnostic as well as therapeutic purposes.

Special tests.

Electrocardiography.—The use of electrocardiography in the study of the normal heart of newborn infants, as well as in the diagnosis of congenital defects, is possible and requires no adaptation of the apparatus except that the metal cuff must be of small size. Care must be taken of course not to expose the infant to cold.

Records of electrocardiograms in the neonatal period are few, but they indicate that there is a characteristic electrocardiogram for this period, which changes to the adult type at about the third month.

Blood pressure.—In taking the blood pressure of infants a small arm band should be used (4–5 cm). Since there is no agreement in the literature as to blood-pressure standards in normal newborn infants, readings of blood pressure are not especially helpful for diagnostic purposes. The systolic pressure at birth is reported as below 100 and not less than 43; the diastolic as not below 40. There is said to be a rise in blood pressure during the first 10 days of life.

Metabolism.—The basal metabolic rate or average daily requirement for maintenance is about 55 calories per kilogram (25 per pound) of body weight per 24 hours. This of course does not make allowance either for growth or for activity. During the first days of life the total caloric requirements are low, about 60 calories per kilogram; during the second and third weeks they rise rapidly to about 100, the maximum, 120, being reached at about the seventh week. There is then a gradual fall in the caloric requirements, so that at the end of the first year the requirement is about 100 calories per kilogram, or 45 per pound.

Mental tests.—Tests of intelligence have not yet been developed for the infant at birth and in the neonatal period. The tests that have been developed are applicable at 3 months at the earliest.

REEXAMINATIONS DURING AND AT THE END OF NEONATAL PERIOD

The methods of appraisal of the newborn infant that have been discussed apply to the entire neonatal period, which is ordinarily considered as including the first month of life. Too frequently an appraisal is made at or shortly after birth and no further observations or examinations are made, particularly if the weight chart shows that the infant is making satisfactory gains. This neglect of the infant by the physician in the neonatal period has often led to serious results. It is wise to keep the infant under close observation even if he appears to be well. The neonatal period is a dangerous period, not alone because of the many physiologic adjustments that are taking place but because certain serious conditions, such as icterus gravis and erythroblastosis occur in this period. Early diagnosis is of the greatest importance if proper treatment is to be instituted.

As a rule it is unwise to call the parents' attention in the first few days of life to minor abnormalities or suspected major abnormalities until sufficient time has elapsed to make sure of their significance. Reexamination of the infant in the neonatal period is important because certain findings present at birth, such as heart murmurs, may disappear or change in such a way as to alter earlier impressions. As already stated, another complete examination should be made at the end of the neonatal period.



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INFANT AND MATERNAL MORTALITY AMONG NEGROES

BY

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Infant and Maternal Mortality Among Negroes*

INTRODUCTION

The mortality of Negro infants and mothers has long been recognized as extremely high, but the actual situation has been somewhat obscure because statistics for Negroes customarily are combined with those for other nonwhite races such as Indian, Chinese, Japanese. This study presents statistics for the Negro as such.

Information with respect to the Negro, as distinct from other races, is greatly needed in connection with planning and developing community programs directed toward reducing the mortality among Negro infants and mothers. The information is especially pertinent at the present time on account of the new maternal and child-health programs being developed under the Social Security Act.

This report presents the available statistics with respect to infant and maternal mortality among Negroes; it reviews the present situation in detail and indicates the general trend of mortality throughout the period of record. In connection with this analysis the underlying factors that affect the reliability of the statistics are discussed.

The material presented for Negroes includes statistics for the expanding birth-registration area, 1915-35, for the geographic sections used for statistics of Negroes by the United States Bureau of the Census, and for the 29 States with 500 or more Negro live births annually.¹ The geographic sections are the Southern States (17 States, including the District of Columbia, which is considered as a State throughout this report), the Northern States (21), and the Western States (11). Of the 29 individual States for which detailed material is presented 17 are Southern, 11 Northern, and 1 Western.

Statistics for white infants and mothers are presented for the purpose of contrasting the mortality experience of the Negro and white races. The more favorable situation of the white race is not suggested as an optimum expectation for the Negro, but rather as an early objective to be reached through improvement in environmental conditions and through health education. There is general appreciation of the need for improvement in maternal and child-health conditions among all races in the United States. Even in the States with the lowest infant and maternal mortality rates (States in which the population is largely white) active effort is being directed toward the reduction of mortality among mothers and infants through the provision of adequate prenatal, natal, and postnatal care, and through the education of mothers in improved methods of infant care and feeding.

* Reprinted, with the addition of some 1935 figures, from the *Journal of Negro Education* for July 1937.

¹ Mortality rates based on 500 or more live births have been demonstrated to be sufficiently stable to be indicative of real differences in health conditions. See *The Significance of Infant Mortality Rates*, by M. Derryberry and E. Van Buskirk. United States Public Health Service Reports, vol. 51, no. 15 (May 1, 1936), pp. 545-551.

The research and informational services of the Children's Bureau have always been inclusive of the children of all races, and all phases of maternal and child-welfare work in the social-security program include services for both Negroes and whites. Practically all States with large Negro populations are employing Negro nurses on State and county staffs, although they are not always indicated separately in the plans and budgets. Many types of health-education services for Negroes are under way in the several States.

The statistics presented in this report are based on the information on births and deaths issued by the United States Bureau of the Census.² The section on stillbirths contains, in addition to census figures, a few preliminary statistics from the special study of causes of stillbirths that is now being made by the Children's Bureau with the cooperation of the Subcommittee on Stillbirths of the American Public Health Association.

The statistics of births and deaths issued by the United States Bureau of the Census are compiled from transcripts of the original birth and death certificates. These certificates, the raw material for all birth and mortality statistics, are filed by physicians, midwives, and others with the local registrars of vital statistics, in the communities in which the births and deaths occur.

The usual procedure of registration includes the filing of a certificate for each birth and each death in the local community and the transmittal of a copy to the State department in charge of vital records. Transcripts of the certificates received in the State office are transmitted to the United States Bureau of the Census for confidential use in the preparation of the statistics which are essential for the protection and promotion of national health.

The initial responsibility for registration of births and deaths lies with the local community. The accuracy and completeness of the statistics for the country as a whole and for each State depend upon the accuracy and completeness of registration in each community of the State and, in the last analysis, upon the degree to which physicians, midwives, and parents realize the importance of filing vital records and appreciate the advantage of having births and deaths recorded.

The Bureau of the Census has estimated³ that registration in the United States as a whole is about 92 percent complete for births and about 97 percent complete for deaths. Special studies⁴ have shown that the percentage of completeness varies widely from State to State and that registration is less complete for the Negro than for the white. It is widely recognized that birth registration is less complete in rural than in urban areas.

² The statistics of births and deaths from 1915 to 1934 have been compiled from the annual reports entitled "Birth, Stillbirth, and Infant Mortality Statistics" and "Mortality Statistics", published by the U. S. Bureau of the Census, and from unpublished tables on file in the Vital Statistics Division of that Bureau. These unpublished tables have been made available through the courtesy of the Director of the U. S. Bureau of the Census. The statistics for 1935 are from Vital Statistics Special Reports which are being issued by the Bureau of the Census for individual States. These State summaries contain much information on Negroes never previously made available.

³ Release of Department of Commerce, Bureau of the Census, Estimated Population of the United States as of July 1, 1935, dated Feb. 12, 1936.

⁴ See the Completeness of Birth Registration in the United States, by P. K. Whelpton. *Journal of the American Statistical Association*, vol. 29, no. 186 (June 1934), pp. 125-136.

THE PRESENT SITUATION

NEGRO BIRTHS

In the United States, 1 child out of every 8 born alive is a Negro child. In the Southern States, 1 child out of every 4 born alive is Negro; in the Northern States, 1 out of every 27; in the Western States, 1 out of every 115.

More than a quarter of a million Negro infants are born each year in the United States. Almost two-thirds of these Negro infants are born in the rural areas⁵ in the Southern States, but in every large city in the South and in many large cities of the North considerable numbers of Negro births occur each year.

In the Southern States about 208,000 Negro infants are born each year. More than three-fourths of the Negroes born in the Southern States are born in rural areas, but the number in urban areas is also sizable, as more than 46,000 Negro live births occur annually in Southern cities.

In the Northern States about 43,000 Negro live births occur each year. Of these Negro infants, about nine-tenths are born in cities and one-tenth in rural areas.

In the Western States the number of Negro live births is about 1,600 each year. More than half of the Negro infants born in the Western States are born in cities in California.

In this analysis of the present infant and maternal mortality situation among Negroes, the statistics presented are, in the main, averages for the 3-year period, 1933-35. These are the years for which the statistics cover the entire United States. Certain statistics are presented for the year 1935 only, figures for previous years not having been tabulated separately for Negroes by the United States Bureau of the Census.

The States with the largest number of Negro live births are, of course, in the South. (Fig. 1.) Georgia heads the list with an annual average of 25,776 Negro live births (table 1). Mississippi, with 25,142, has almost as large a number. North Carolina, Alabama, and South Carolina average between 21,000 and 24,000 a year; Louisiana has 17,000, Virginia 15,000, and Texas 14,000. No Northern State has as many as 10,000 Negro births a year. In both the North and the South there are States with between 5,000 and 10,000 Negro live births each year. The Northern States with this number are New York, Pennsylvania, Illinois, and Ohio; the Southern States are Arkansas, Florida, Tennessee, and Maryland. The States with as many as 2,000 but less than 5,000 Negro births include the Northern States of New Jersey, Missouri, and Michigan, and the Southern States of Kentucky, West Virginia, and the District of Columbia. The States with between 500 and 2,000 Negro live births include Indiana, Kansas, Massachusetts,

⁵ Throughout this study the term "rural" is used to include areas of less than 10,000 population. The term "urban" is used to include cities of 10,000 or more population.

and Connecticut in the North; Oklahoma and Delaware in the South; and California in the West.

In many of the Southern States a large proportion of all live births registered are Negro. In Mississippi and South Carolina more than 50 percent of the live births are Negro; in Louisiana and Georgia, more than 40 percent; in Alabama, the District of Columbia, North Carolina, Florida, and Virginia, more than 25 percent. In the 8 remaining Southern States less than 25 percent of the live births are Negro (in 5 States, 10 to 24 percent and in 3 States, less than 10 percent). Of the Northern States, New Jersey had the highest proportion (7.8 percent); Massachusetts, the lowest (1.5 percent). (Fig. 2.)

The Negro births in the Southern States were for the most part in rural areas. (Table 1.) In Mississippi and Arkansas more than nine-tenths of the Negro births were in rural areas; in South Carolina, West

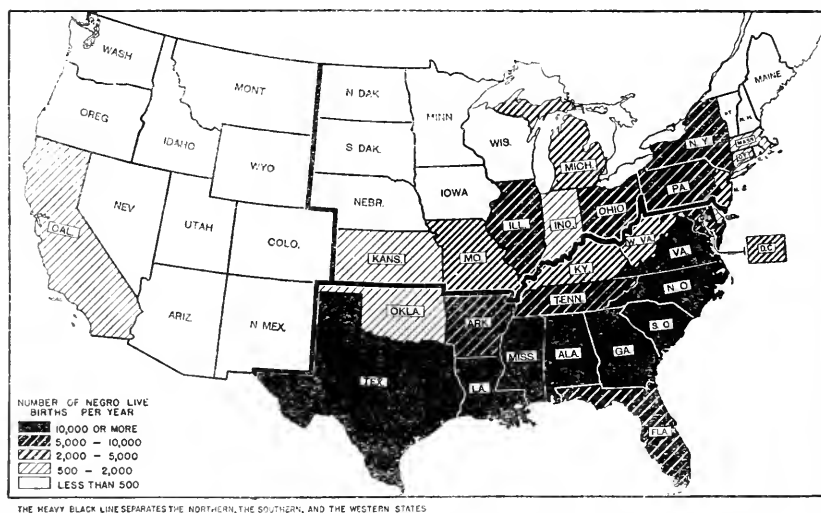


FIGURE 1.—AVERAGE NUMBER OF NEGRO LIVE BIRTHS PER YEAR IN EACH STATE, 1933-35.

Virginia, North Carolina, Alabama, and Georgia more than four-fifths; in Virginia, Texas, Louisiana, and Florida more than two-thirds; and in Oklahoma, Kentucky, Delaware, and Tennessee considerably more than half of the Negro births were in rural areas. In Maryland, the remaining Southern State, only 44 percent occurred in rural areas. The District of Columbia, which is grouped with the Southern States, is, of course, entirely urban.

In the Northern States the Negro births generally occurred in cities. In every Northern State more than two-thirds of the Negro infants are city-born. Michigan had the largest proportion (93 percent) and Missouri the smallest (70 percent).

The only Western State (California) with as many as 500 Negro live births had more than 80 percent of its Negro births in cities—practically all in Los Angeles.

Information is not available with respect to the numbers of Negro births in individual cities, but the Negro urban population of the North is largely concentrated in a few large cities, and it is obvious

that it is in these cities that the Negro births mainly occur. In 1930, as is shown by the census of population, more than 50 percent of all the urban Negro population of the North resided in 7 cities (New

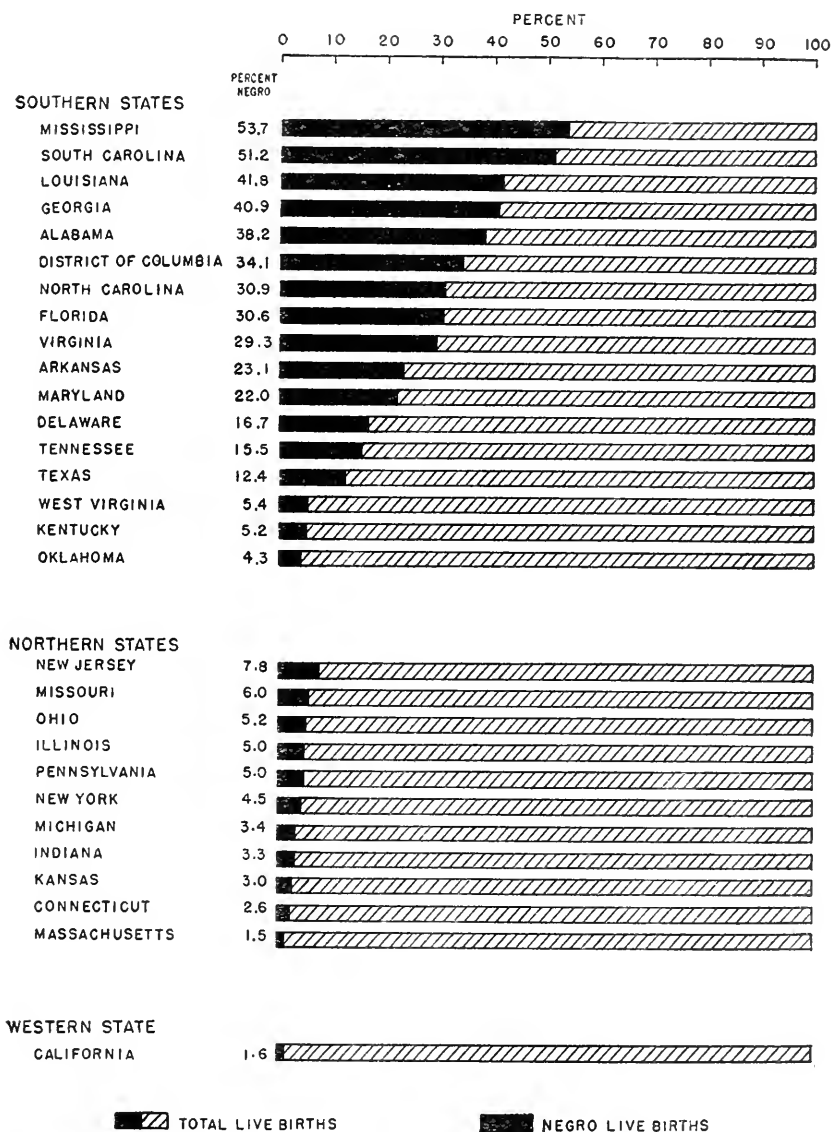


FIGURE 2.—PROPORTION OF TOTAL LIVE BIRTHS THAT WERE NEGRO; 29 STATES, 1933-35.

York, Chicago, Philadelphia, Detroit, St. Louis, Cleveland, and Pittsburgh), and these cities, together with 6 others (Cincinnati, Indianapolis, Newark, Kansas City, Mo., Columbus, and Boston), included two-thirds of the urban Negro population of the Northern States.

TABLE 1.—Average number of Negro live births annually in rural and urban areas; geographic sections and 29 States, 1933-35

Geographic section and State	Negro live births				
	Total	In rural areas		In urban areas	
		Number	Percent	Number	Percent
United States.....	252,835	167,857	66.4	84,978	33.6
All Southern States (17).....	208,489	161,911	77.7	46,578	22.3
Alabama.....	23,590	19,192	81.4	4,398	18.6
Arkansas.....	8,407	7,750	92.2	657	7.8
Delaware.....	664	410	61.8	254	38.2
District of Columbia.....	3,511	-----	-----	3,511	100.0
Florida.....	8,194	5,493	67.0	2,701	33.0
Georgia.....	25,776	20,635	80.1	5,141	19.9
Kentucky.....	3,025	1,886	62.3	1,139	37.7
Louisiana.....	17,424	12,216	70.1	5,208	29.9
Maryland.....	6,026	2,663	44.2	3,363	55.8
Mississippi.....	25,142	23,385	93.0	1,757	7.0
North Carolina.....	24,065	19,915	82.8	4,150	17.2
Oklahoma.....	1,927	1,218	63.2	709	36.8
South Carolina.....	21,372	19,161	89.7	2,211	10.3
Tennessee.....	8,030	4,595	57.2	3,435	42.8
Texas.....	14,052	9,957	70.9	4,095	29.1
Virginia.....	15,124	11,595	76.7	3,529	23.3
West Virginia.....	2,160	1,840	85.2	320	14.8
All Northern States (21).....	42,698	5,584	13.1	37,114	86.9
Connecticut.....	573	52	9.1	521	90.9
Illinois.....	5,533	500	9.0	5,033	91.0
Indiana.....	1,736	153	8.8	1,583	91.2
Kansas.....	946	254	26.8	692	73.2
Massachusetts.....	934	141	15.1	793	84.9
Michigan.....	2,826	195	6.9	2,631	93.1
Minnesota.....	3,448	1,045	30.3	2,403	69.7
Missouri.....	4,273	798	18.7	3,475	81.3
New Jersey.....	8,304	637	7.7	7,667	92.3
New York.....	5,195	714	13.7	4,481	86.3
Pennsylvania.....	7,972	931	11.7	7,041	88.3
All Western States (11).....	1,648	362	22.0	1,286	78.0
California.....	1,208	215	17.8	993	82.2

The urban Negro population of the South is more widely distributed than that of the North. Every large Southern city has a considerable number of Negro residents and, therefore, many Negro births. Of the urban Negro population of the Southern States, about half lived in 22 cities, whereas a similar proportion of the urban Negro population of the Northern States was concentrated in 7 cities.

Attendant at birth.

Of all the Negro live births in 1935 more than half (56 percent) were attended at delivery by midwives; only 43 percent were attended by physicians (17 percent in hospitals and 26 percent in homes); 1 percent were attended by other persons, such as relatives or friends. (Table 2.)

The large proportion of Negro births attended by midwives and the small proportion occurring in hospitals are in sharp contrast to corresponding proportions for white births and also for births among other races. In the United States as a whole practically all (94 percent) of the white infants born alive in 1935 were attended at

birth by physicians (40 percent of the births in hospitals). Among other races (Indians, Chinese, Japanese, and so forth) only 13 percent of the live births were attended by midwives; 75 percent were attended by physicians (38 percent in hospitals); and 12 percent were attended by other persons.

TABLE 2.—*Attendant at birth of white and Negro infants and infants of other races born alive in the United States, 1935*

Race	Percent of live-born infants attended at birth by—				
	Physicians			Mid-wives	Other persons
	Total	In hos-pitals	In homes		
Total.....	87.5	36.9	50.6	10.7	1.8
Negro.....	43.2	17.3	26.0	56.0	.8
White.....	93.6	39.6	54.0	4.5	1.9
Other races.....	74.7	38.4	36.3	12.9	12.4

Whether the birth of a Negro infant is attended by a physician or by a midwife and whether or not the birth occurs in a hospital apparently depends, as a rule, upon whether the infant is born in the North or in the South and, if in the South, upon whether the birth occurs in an urban or in a rural district. In 1935 practically all Negro births in Northern cities (97.9 percent) were attended by physicians, the majority (61.8 percent) in hospitals. In Southern cities physicians attended almost three-fourths (73.0 percent) of the Negro births; more than a third (38.5 percent) occurred in hospitals.

In the rural districts of the South it is a different story. In 1935 practically no Negro births (0.6 percent) occurred in hospitals; physicians attended only 20.0 percent of all the Negro births. Approximately 130,000 (79.3 percent) of the Negro births in the rural South in 1935 were attended by midwives. In the rural areas of the Southern States the numbers of Negro live births attended by midwives were: Mississippi, about 21,000; Alabama, Georgia, and South Carolina, more than 16,000 each; North Carolina and Louisiana, more than 11,000 each; Virginia, more than 8,000; Texas and Arkansas, more than 6,000 each; and Florida, more than 4,000. (Table 3.)

Age of mother.

The mothers of the Negro infants born during the period 1933-35 not only as a rule lived in rural areas and were generally attended by midwives, but many of them were so young that they could not be expected to have much appreciation of their own need for adequate care or much education with respect to methods of feeding and caring for infants. Of the Negro mothers for whom age was reported, 23 percent were under 20 years of age as compared with 11 percent of the white mothers. These are young ages for childbearing and rearing. Fifty-five percent of the mothers of Negro infants were under 25 years of age, as compared with 41 percent of the mothers of white infants. (Table 4.)

TABLE 3.—*Attendant at birth of Negro infants born alive in rural and urban areas; geographic sections and 29 States, 1935*

Geographic section and State	Negro infants born alive in—											
	Rural areas						Urban areas					
	Number	Percent attended at birth by—					Number	Percent attended at birth by—				
		Physicians			Mid-wives	Other		Physicians			Mid-wives	Other
		Total	In hospitals	In homes				Total	In hospitals	In homes		
United States.....	169,392	22.4	1.2	21.2	76.7	0.9	85,732	84.3	49.0	35.3	15.1	0.6
All Southern States (17).....	163,414	20.0	.6	19.4	79.3	.7	46,929	73.0	38.5	34.5	26.5	.5
Alabama.....	19,491	14.9	.1	14.8	84.7	.4	4,371	69.1	32.3	36.8	30.8	.1
Arkansas.....	7,779	14.2	.1	14.1	83.2	2.6	723	62.4	5.8	56.6	36.1	1.5
Delaware.....	397	31.7	4.3	27.5	68.3	-----	259	66.8	59.5	7.3	33.2	-----
District of Columbia.....	-----	-----	-----	-----	-----	-----	3,617	99.7	76.5	23.2	.1	.2
Florida.....	5,692	17.1	1.0	16.0	81.8	1.2	2,756	43.8	16.8	27.0	55.8	.5
Georgia.....	20,871	10.1	.1	10.0	89.7	.2	5,048	70.0	45.0	25.1	29.9	.1
Kentucky.....	1,748	85.1	.7	84.3	14.6	.3	1,043	95.9	42.1	53.8	4.1	-----
Louisiana.....	12,322	9.9	.1	9.8	89.9	.2	5,460	78.8	62.5	16.3	21.2	(1)
Maryland.....	2,561	47.1	4.6	42.4	51.9	1.0	3,332	90.9	45.9	44.9	9.0	.1
Mississippi.....	24,375	13.5	.6	12.9	86.1	.5	1,884	27.0	8.4	18.6	72.5	.6
North Carolina.....	20,126	28.1	.7	27.4	71.6	.3	4,231	61.8	17.8	44.0	38.0	.2
Oklahoma.....	1,223	47.2	.8	46.4	47.6	5.2	742	79.9	16.2	63.7	19.9	.1
South Carolina.....	18,822	10.0	.2	9.8	90.0	(1)	2,167	65.5	20.1	45.4	34.4	(1)
Tennessee.....	4,744	44.8	.2	44.6	54.7	.5	3,585	94.7	48.0	46.7	3.5	1.8
Texas.....	9,809	31.2	.3	30.9	66.1	2.7	4,067	79.5	42.7	36.8	18.8	1.7
Virginia.....	11,507	26.7	2.0	24.7	71.6	1.7	3,332	55.7	17.1	38.6	43.6	.7
West Virginia.....	1,947	95.7	2.2	93.5	2.3	2.1	312	98.7	20.8	77.9	.6	.6
All Northern States (21).....	5,614	89.7	17.7	72.0	5.5	4.9	37,445	97.9	61.8	36.1	1.2	.8
Connecticut.....	46	(2)	(2)	(2)	(2)	(2)	508	98.2	69.7	28.5	1.6	.2
Illinois.....	548	92.5	7.1	85.4	3.3	4.2	5,138	99.6	55.2	44.4	.2	.3
Indiana.....	159	100.0	9.4	90.6	-----	-----	1,669	98.9	23.9	75.0	.8	.2
Kansas.....	218	99.1	11.5	87.6	.5	.5	694	98.8	21.5	77.4	1.0	.1
Massachusetts.....	132	7.6	7.6	-----	-----	92.4	746	76.0	65.8	10.2	-----	21.0
Michigan.....	192	88.0	13.0	75.0	10.4	1.6	2,691	97.2	45.4	51.7	2.0	.9
Missouri.....	1,048	67.7	8.5	59.3	21.6	10.7	2,502	99.2	66.5	32.6	.8	-----
New Jersey.....	776	97.7	34.0	63.7	1.9	.4	3,407	97.6	70.9	26.7	2.3	(1)
New York.....	612	97.4	50.5	46.9	2.1	.5	7,736	97.1	79.8	17.3	2.8	.1
Ohio.....	729	99.6	1.6	97.9	-----	.4	4,467	99.7	48.6	51.0	.2	.2
Pennsylvania.....	980	98.4	8.5	89.9	1.4	.2	7,081	98.5	67.6	30.8	.6	1.0
All Western States (11).....	364	92.0	41.2	50.8	4.1	3.8	1,358	98.5	59.4	39.0	.7	.8
California.....	203	94.1	61.6	32.5	-----	5.9	1,055	98.6	61.6	37.0	.4	1.0

¹ Less than one-tenth of 1 percent.² Percent not shown because the number of Negro live births was less than 50.

Negro mothers in the Southern States were in general younger than Negro mothers in the Northern States. In the Southern States 24 percent were under 20 years of age, as compared with 21 percent in the Northern States; 56 percent in the Southern States were under 25 years of age, as compared with 51 percent in the Northern States. Although the differences in age distribution are not so great between Negro mothers in the South and the North as between Negro and white mothers, they are sufficient to be statistically significant in view of the large numbers of births to Negro mothers under 25 years. Infants born to Negro mothers under 25 years of age numbered approximately 138,000 annually in the United States during the years 1933-35; of these infants, 115,000 were born in the Southern States, 22,000 in the Northern States, and about 1,000 in the Western States.

TABLE 4.—*Age of mother of Negro and white infants born alive in the United States, 1933-35*

Age of mother	Average number of infants born alive annually			
	Negro		White	
	Number	Percent	Number	Percent
Total.....	252,836		1,849,730	
Age reported.....	249,706	100.0	1,844,443	100.0
10 to 14.....	1,679	.7	1,181	.1
15 to 19.....	56,215	22.5	202,130	11.0
20 to 24.....	79,729	31.9	556,436	30.2
25 to 29.....	51,650	20.7	496,905	26.9
30 to 34.....	31,941	12.8	322,542	17.5
35 to 39.....	20,964	8.4	191,574	10.4
40 to 44.....	6,553	2.6	67,423	3.7
45 to 49.....	941	.4	6,167	.3
50 to 54.....	34	(¹)	88	(¹)
Age not reported.....	3,130		5,284	

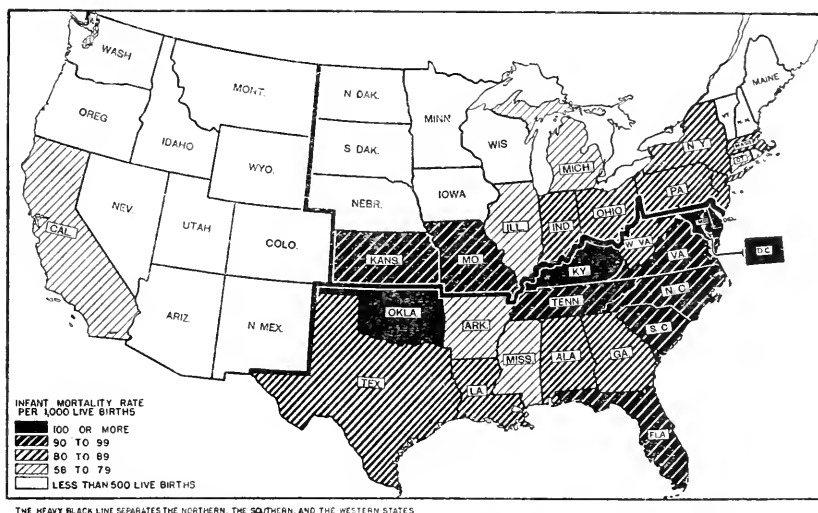
¹ Less than one-tenth of 1 percent.

FIGURE 3.—MORTALITY AMONG NEGRO INFANTS IN STATES WITH 500 OR MORE NEGRO LIVE BIRTHS PER YEAR, 1933-35.

INFANT MORTALITY

In each year of the period 1933-35, about 22,000 live-born Negro infants died in the United States before completing their first year of life. The average mortality rate for Negro infants in the United States, as well as in each of the 29 States with 500 or more Negro live births annually, was in excess of the rate for white infants. The rate for Negro infants in the United States was 86.1 per 1,000 live births and for white infants, 53.

The average Negro infant mortality rate for the 3-year period, 1933-35, was more than 100 per 1,000 live births in 5 States (Oklahoma, Delaware, Kentucky, Maryland, and the District of Columbia). (Fig. 3 and table 5.) It was between 90 and 99 in 7 States (Missouri,

Tennessee, South Carolina, Virginia, North Carolina, Florida, and Kansas); between 80 and 89 in 11 States (Indiana, New York, Louisiana, Georgia, Pennsylvania, Massachusetts, Ohio, New Jersey, West Virginia, Alabama, and Texas); and less than 80 in 6 States (Illinois, Connecticut, Mississippi, Michigan, California, and Arkansas).

The extreme height of these rates for Negro infants is stressed by comparison with rates for white infants for the same period, 1933-35. (Table 5.) During this period no State had a rate as high as 65 per 1,000 live births for white infants. The highest rates for white infants were between 60.1 and 64.3 per 1,000 live births. Seven States fell in this group (West Virginia, Texas, Tennessee, South Carolina, Georgia, North Carolina, and Virginia). Four States had rates of 55 to 59.9 per 1,000 live births for white infants (Kentucky, Louisiana, Missouri, and Maryland); 9 States, 50 to 54.9 (Alabama, Oklahoma, Delaware, Indiana, Florida, Pennsylvania, Mississippi, Ohio, and Arkansas); and 9 States, less than 50 (Kansas, New York, Michigan, Massachusetts, Illinois, Connecticut, California, New Jersey, and the District of Columbia).

TABLE 5.—*Mortality in the first year of life among Negro and white infants; geographic sections and 29 States, 1933-35*

Geographic section and State	Deaths under 1 year per 1,000 live births		Geographic section and State	Deaths under 1 year per 1,000 live births	
	Negro	White		Negro	White
United States.....	86.1	53.0	All Northern States (21).....	83.6	49.8
All Southern States (17).....	86.7	58.9	Connecticut.....	73.9	46.0
Alabama.....	82.0	54.9	Illinois.....	77.1	47.8
Arkansas.....	58.1	50.0	Indiana.....	88.9	52.2
Delaware.....	111.4	53.1	Kansas.....	92.7	49.8
District of Columbia.....	102.0	44.2	Massachusetts.....	83.9	49.2
Florida.....	93.1	51.6	Michigan.....	65.9	49.3
Georgia.....	84.5	62.3	Missouri.....	98.2	56.0
Kentucky.....	104.9	58.2	New Jersey.....	82.9	44.2
Louisiana.....	87.2	56.6	New York.....	88.1	49.4
Maryland.....	103.8	55.4	Ohio.....	83.0	50.6
Mississippi.....	68.7	51.2	Pennsylvania.....	84.3	51.4
North Carolina.....	94.2	60.7	All Western States (11).....	74.8	54.1
Oklahoma.....	116.9	53.4	California.....	64.3	45.8
South Carolina.....	96.3	63.4			
Tennessee.....	98.0	63.6			
Texas.....	81.6	64.1			
Virginia.....	94.9	60.1			
West Virginia.....	82.7	64.3			

Attention is also called to the high infant mortality among the Negroes by the excess in the rate for Negro infants over the rate for white infants in the same State (fig. 4). In the District of Columbia, Oklahoma, and Delaware the rates for Negro infants were more than 100 percent in excess of the rates for white infants. In New Jersey, Maryland, Kansas, Florida, Kentucky, New York, and Missouri the rates for Negro infants exceeded the rates for white infants by more than 75 percent. In Massachusetts, Indiana, Ohio, Pennsylvania, Illinois, Connecticut, Virginia, North Carolina, Louisiana, Tennessee, and South Carolina the Negro rates were at least 50 percent in excess. The only States in which Negro rates were less than 50 percent in excess of those for white infants were Alabama, California, Georgia, Mississippi, Michigan, West Virginia, Texas, and

Arkansas. In all these States, except Arkansas, the excess of the Negro rates amounted to more than 25 percent. The States with the greatest excess were in the South, but in all the Northern States, except Michigan, the infant mortality rates for Negroes exceeded those for white infants by 60 to 90 percent.

Urban versus rural mortality.

Infant mortality rates for Negroes were higher in urban than in rural districts in the United States as a whole and in the Southern

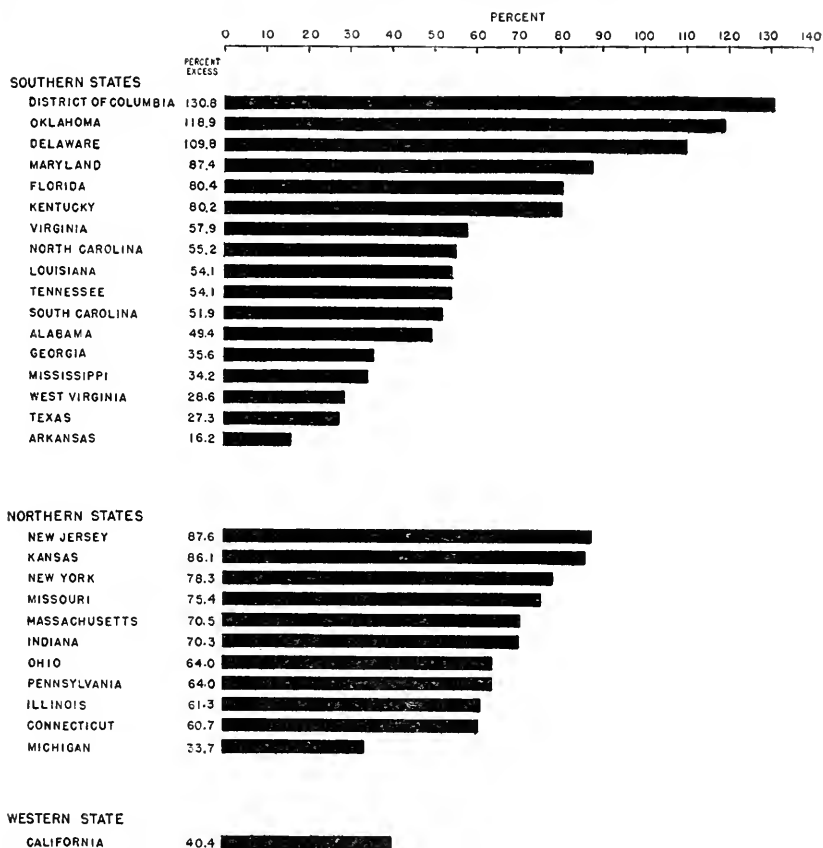


FIGURE 4.—PERCENTAGE EXCESS OF NEGRO INFANT MORTALITY RATES OVER WHITE INFANT MORTALITY RATES; 29 STATES, 1933-35.

States, but in the Northern and in the Western States the rural rates exceeded the urban (table 6). The infant mortality rate for Negroes in rural districts of the United States during the period 1933-35 was 81.0 per 1,000 live births as compared with 96.3 in urban areas. In the South the rural rate was 80.2; the rate for urban areas was 109.3. In the Northern States the rural rate for Negroes (100.9) was almost 20 points higher than the urban (81). In the Western States the Negro infant mortality rate in rural areas was 103.2 as compared with 66.9 in urban areas.

In all the Southern States, except Delaware and Maryland, rural rates for Negroes were lower than urban rates. In seven Northern States (Illinois, Kansas, Massachusetts, Michigan, Missouri, New Jersey, and Pennsylvania) the rural rates were much higher than the urban. In four Northern States (Connecticut, Indiana, New York, and Ohio) the urban rates were higher than the rural. In California the rural rate for Negroes exceeded the urban.

TABLE 6.—*Mortality in the first year of life among Negro and white infants in rural and urban areas; geographic sections and 29 States, 1933-35*

Geographic section and State	Deaths under 1 year per 1,000 live births			
	Negro		White	
	Rural	Urban	Rural	Urban
United States.....	81.0	96.3	53.9	52.1
All Southern States (17).....	80.2	109.3	56.0	68.0
Alabama.....	76.2	107.3	52.8	64.3
Arkansas.....	54.4	102.0	48.0	67.5
Delaware.....	124.3	90.7	54.8	51.8
District of Columbia.....		102.0		44.2
Florida.....	91.4	96.4	51.2	52.1
Georgia.....	78.4	109.1	60.4	69.0
Kentucky.....	100.7	111.8	56.7	65.9
Louisiana.....	78.1	108.4	51.4	67.0
Maryland.....	122.9	88.7	54.5	56.1
Mississippi.....	66.9	92.0	47.9	72.0
North Carolina.....	87.3	127.1	57.3	77.7
Oklahoma.....	109.2	130.2	50.3	63.6
South Carolina.....	91.8	135.5	61.1	74.9
Tennessee.....	81.0	120.6	59.4	78.4
Texas.....	71.5	106.1	57.4	78.0
Virginia.....	89.2	113.9	59.8	61.0
West Virginia.....	81.2	91.6	60.6	82.7
All Northern States (21).....	100.9	81.0	50.6	49.3
Connecticut.....	70.1	74.3	49.0	45.3
Illinois.....	119.3	72.9	51.2	46.1
Indiana.....	74.2	90.3	49.3	55.7
Kansas.....	102.5	89.1	48.7	52.4
Massachusetts.....	92.4	82.4	47.1	49.5
Michigan.....	78.5	65.0	47.9	50.3
Missouri.....	139.0	80.5	58.1	52.8
New Jersey.....	88.5	81.6	47.0	43.5
New York.....	80.1	88.7	50.7	49.1
Ohio.....	72.4	84.7	50.5	50.6
Pennsylvania.....	109.6	81.0	53.4	49.7
All Western States (11).....	103.2	66.9	61.2	46.6
California.....	94.6	57.7	50.6	43.2

The excess in the rates in urban areas for Negro infants, especially in the Southern States, emphasizes the great need of child-health activities for Negroes in Southern cities. It does not, however, minimize the importance of work in the rural areas. As was previously pointed out, more than three-fourths (161,900) of the Negro infants born in the Southern States each year were born in the rural areas and less than one-fourth (46,600) in urban areas. The number

of Negro infant deaths each year in rural areas of the Southern States was 13,000 and in urban areas 5,100. These figures on births and deaths in rural and urban areas of the Southern States must be taken into consideration in the determination of the greatest opportunity for service for Negro mothers and babies.

Among white infants in the United States as a whole, in the Northern States, and in the Western States, the mortality in the first year of life in rural areas exceeded that in urban. In the Southern States mortality in rural areas was lower than in urban. The differences in the rates in urban and rural areas in the United States as a whole and in the Northern States are small, but they add emphasis to the importance of the rural problem. The States in which rural rates for white infants exceeded urban rates are: Delaware, Connecticut, Illinois, Missouri, New Jersey, New York, Pennsylvania, and California.

The difference between the urban and rural rates in each State is less for white infants than for Negro. In connection with the greater mortality of white infants in rural areas than in urban in the United States as a whole, it is important to note that more than half (53 percent) of the white infants born alive each year are born in rural areas, and that child-health activities have been long established in most cities, whereas such activities have only recently been initiated on a large scale in rural areas.

Cause of death.

As is shown by death certificates, natal and prenatal causes were responsible for more deaths of Negro infants during the period 1933-35 than any other cause. (Table 7.) The deaths from these causes occurred largely in the first month of life. These causes, which include premature birth, congenital debility, injury at birth, congenital malformations, and syphilis, were responsible for the deaths of 34 out of every 1,000 Negro infants born alive. Respiratory diseases stood next in importance and caused the deaths of 16 Negro infants out of every 1,000 born alive; gastrointestinal diseases stood third, with 9 deaths for every 1,000 live births; epidemic and other communicable diseases, especially whooping cough and measles, were fourth, with 5 deaths for every 1,000 live births. The mortality rates from these types of causes, which are medical and biological entities, understate for Negro infants the actual death toll for which they are responsible; for 17 percent of all Negro infant deaths in 1933-35 the cause of death was either omitted from the death certificate or stated in such indefinite terms that it was not classifiable. The corresponding proportion for white infants was only 4 percent.

The mortality rate for Negro infants was greatly in excess of the corresponding rate for white infants. The rate for Negro infants from natal and prenatal causes exceeded the rate for white infants by 15 percent; from respiratory diseases, by 90 percent; from gastrointestinal diseases, by 67 percent; and from epidemic and other communicable diseases, by 81 percent.

TABLE 7.—*Mortality from specified causes in the first year of life among Negro and white infants; United States, 1933-35*

Cause of death	Deaths under 1 year per 1,000 live births		Cause of death	Deaths under 1 year per 1,000 live births	
	Negro	White		Negro	White
All causes.....	86.1	53.0	Gastrointestinal diseases.....	9.0	5.4
Natal and prenatal causes.....	34.3	29.7	Diarrhea and enteritis.....	7.8	4.9
Premature birth.....	19.1	15.4	Dysentery.....	.7	.3
Congenital debility.....	4.2	1.9	Diseases of the stomach.....	.5	.2
Injury at birth.....	3.3	4.7	Epidemic and other communicable diseases.....	4.7	2.6
Congenital malformation.....	2.1	5.4	Whooping cough.....	3.0	1.3
Other diseases of early infancy.....	2.5	1.8	Measles.....	.6	.4
Syphilis.....	2.9	.4	Tuberculosis (all forms).....	.7	.3
Tetanus.....	.3	(¹)	Diphtheria.....	.2	.1
Respiratory diseases.....	16.0	8.4	Other diseases.....	.2	.4
Bronchitis and bronchopneumonia.....	8.4	5.4	External causes.....	1.8	.9
Influenza and pneumonia.....	7.5	3.1	All other causes.....	5.8	3.9
			Unknown or ill-defined diseases.....	14.5	2.0

¹ Less than one-tenth per 1,000 live births.**Age at death.**

More than half of the Negro infants who die in the first year of life die in the first month. During the period 1933-35 an annual average of 21,778 Negro infants died in the first year of life, and of these, 11,329 died in the first month of life and 10,449 in the second to the twelfth month. The mortality in the first day and the first week is especially high. In each of the months after the first month the number of infants dying is smaller than in the month preceding. Whereas 52 percent of all infants who died under 1 year of age in 1933-35 died in the first month of life, the proportion in the second month was 9 percent, and in each succeeding month it was even less. (Table 8.)

TABLE 8.—*Average number of Negro infants who died in each month of the first year of life; United States, 1933-35*

Month of life	Deaths of Negro infants	
	Number	Percent
First year.....	21,778	100.0
First.....	¹ 11,329	52.0
Second.....	1,887	8.7
Third.....	1,465	6.7
Fourth.....	1,304	6.0
Fifth.....	1,101	5.1
Sixth.....	914	4.2
Seventh.....	888	4.1
Eighth.....	709	3.3
Ninth.....	638	2.9
Tenth.....	578	2.7
Eleventh.....	475	2.2
Twelfth.....	490	2.3

¹ Of these infants, 4,287 died in the first day of life and 8,214 in the first week.

Neonatal mortality.

The mortality rate of Negro infants who died in the first month of life (generally called the neonatal period) during 1933-35 was 44.8 per 1,000 live births, as compared with 31.7 for white infants. Natal and prenatal conditions were largely responsible for this mortality; the neonatal rate among Negro infants from causes of this type was 29.2 per 1,000 live births. Next in numerical importance stood respiratory diseases (2.5 per 1,000 live births). The deaths of young infants due to respiratory conditions are recognized as closely related to natal and prenatal causes and as seldom due to infections of the respiratory tract contracted postnatally.

Mortality in the second to the twelfth month of life.

Of the more than 240,000 Negro infants who were born alive and survived the first month of life each year of the period 1933-35, about 10,450 died before completing their first year (i. e., in the second to the twelfth month)—a mortality rate of 43.3 per 1,000 infants surviving the first month. The corresponding rate for white infants was 22.0 per 1,000 survivors.

Respiratory diseases, with a rate of 14.1, were responsible for the deaths of more Negro infants than any other group of causes. Gastrointestinal diseases stood second (8.3), natal and prenatal conditions, third (5.3), and epidemic and other communicable diseases, fourth (4.6). Had the cause of death for Negro infants been more completely entered on the death certificates, the rates for all these types of causes would have been higher. Among Negro infants dying in this period of life, 5.2 deaths per 1,000 survivors were classified as due to unknown or ill-defined diseases.

STILLBIRTHS

In considering the total loss of life due to natal and prenatal conditions it is imperative to include consideration of fetal mortality, or stillbirths—i. e., infants that present no evidence of life at birth. More than 18,000 Negro stillbirths are registered annually in the United States. The stillbirth rate per 1,000 live births was 72 for Negroes during the period 1933-35, as compared with 32 for the white. For both races these rates greatly understate the actual fetal loss.

The stillbirth rates among Negroes in the individual States are of little real value. "Stillbirth registration is recognized as grossly incomplete in practically all sections of the country."⁶ It is generally conceded that the incompleteness of registration of stillbirths is greater among Negroes than among white. There is a glaring lack of uniformity in the minimum period of gestation for which registration of stillbirths is required in the States. Variation also exists in the evidence of life used to distinguish between live births and stillbirths.⁷

⁶ See Stillbirths: Report of the Subcommittee on Stillbirths of the Committee on Accuracy of Certified Causes of Death (American Public Health Association Year Book, 1935-36, pp. 224-249).

⁷ See Comparability of Maternal Mortality Rates in the United States and Certain Foreign Countries, by Elizabeth C. Tandy (Children's Bureau Pub. 229), footnote 15, p. 17, for summary of replies from State officials giving information regarding the distinction between live births and stillbirths.

The study of stillbirths⁸ that is being made by the Children's Bureau with the cooperation of the Subcommittee on Stillbirths of the American Public Health Association will supply much-needed information regarding the fetal and maternal conditions associated with stillbirths among Negroes. This study is under way in 216 hospitals, located in 49 cities in 26 States and the District of Columbia. The cities are widely scattered, being located in every geographic section of the United States. Forty-five of the 49 cities had 100,000 or more population in 1930.⁹

The total number of schedules will be about 6,000. It appears from the first 4,500 received that the 6,000 schedules will include about 1,000 schedules of Negro stillbirths. The first 2,000 schedules of stillbirths received from hospitals include 346 Negro stillbirths, 1,636 white stillbirths, 17 stillbirths of other races, and 1 stillbirth for which race was not reported. A few of the pertinent findings from the preliminary analysis of these 2,000 schedules with particular reference to the findings from the 346 schedules for Negro stillbirths follow. All these findings, especially those with respect to Negroes, are preliminary.

The racial distribution of these first 2,000 stillbirths is similar to that for all the stillbirths registered in urban areas of the United States in 1935. Of the first 2,000 stillbirths, 17 percent were to Negro mothers, 82 percent to white mothers, and 1 percent to mothers of other races (Chinese, Japanese, and Puerto Rican). The corresponding percentages for all the stillbirths registered in the urban areas of the United States during 1935 were 18, 82, and less than 1, respectively.

Of the 346 Negro stillbirths included in the first 2,000 stillbirths, 33 percent were to primiparae, as compared with 30 percent of the total Negro stillbirths registered in the United States in 1935; 67 percent to multiparae, the same proportion as in the United States as a whole (for 3 percent of the registered stillbirths, parity of the mother was not reported). Of these 346 Negro stillbirths, 22 percent were to mothers under 20 years of age and 46 percent to mothers 20 to 29 years, as compared with 22 percent and 50 percent, respectively, of the total Negro stillbirths registered in the United States in 1935 for which age of mother was reported. From this comparison it appears

⁸ For a full description of the plan and purpose of the study and a preliminary analysis of the findings based on the first 1,000 schedules received, see *A Statistical Study of Stillbirths in Hospitals—A Preliminary Report*, American Journal of Public Health (vol. 27, no. 2, February 1937, pp. 161-166). The study is being made by the present writer in cooperation with Ethel C. Dunham, M. D., Director, Division of Research in Child Development, U. S. Children's Bureau.

⁹ The purposes of the study of stillbirths in hospitals, as stated in the general plan, are:

(1) To obtain statistical information regarding fetal and maternal conditions associated with fetal mortality in hospitals.

(2) To make possible the development of a classification of causes of stillbirth (fetal and maternal).

(3) To further the development of a special certificate for registration of stillbirths which will serve as a base for comparable statistics for the various States.

The plan of the study was to obtain from a group of hospitals with large obstetric services individual schedules for all stillbirths of 20 weeks or more gestation delivered in the hospitals during the period of the study.

The definition of a stillborn child is that incorporated in the Rules of Statistical Practice of the American Public Health Association:

A stillborn child is one which shows no evidence of life after complete birth (no breathing, no action of heart, no movement of voluntary muscle). Birth is considered complete when the child is altogether (head, trunk, and limbs) outside the body of the mother, even if the cord is uncut and the placenta still attached. (See Rules of Statistical Practice adopted by the American Public Health Association—Rule no. 18 (18, 1908) and Rule no. 19 (19, 1908 as amended in 1913).)

that these 346 Negro stillbirths are a fairly typical sample of the stillbirths registered in the United States. The similarity of the proportions is surprising in view of the small number of Negro stillbirths included in the first 2,000 schedules.

From the comparison of the percentages for the 346 Negro stillbirths with those for the 1,636 white stillbirths included in the first 2,000 schedules, it appears that—

(1) About the same proportion of the Negro stillbirths (20 percent) were previable (20 to 27 weeks of gestation) as of the white (18 percent), but a much larger proportion of the Negro stillbirths (60 percent) were delivered prior to term (before the thirty-sixth week of gestation) than of the white (46 percent), and that 2 percent of the Negro stillbirths and 6 percent of the white stillbirths were post-term deliveries (i. e., in the forty-first week of gestation or later).

(2) A larger proportion of the Negro stillbirths (64 percent) than of the white (54 percent) were dead before the onset of labor.

(3) A larger proportion of the Negro (71 percent) than of the white (59 percent) were spontaneous deliveries and, correspondingly, a smaller proportion of the Negro (29 percent) than of the white (41 percent) were operative deliveries. In approximately three-fourths of the operative deliveries of both Negro and white, the fetus was dead prior to the operation.

From the preliminary analysis of maternal conditions underlying these 346 Negro and 1,636 white stillbirths, it appears that about 30 percent of the Negro and 11 percent of the white stillbirths were associated with nonpuerperal conditions in the mother. Of these the most important was syphilis, which was reported for 25 percent of the Negro stillbirths as compared with 2 percent of the white. Puerperal conditions were responsible for 43 percent of the Negro stillbirths and 61 percent of the white. The percentage of cases associated with hemorrhage (antepartum and intrapartum hemorrhage, placenta previa, and premature separation of placenta) was very similar for the two races (17 percent for the Negro and 19 percent for the white). Toxemias of pregnancy were reported somewhat less frequently for the Negro (13 percent) than for the white (17 percent). A striking difference between the races appears in the proportions of fetal deaths associated with abnormalities of labor and delivery; these were responsible for 10 percent of the Negro stillbirths as compared with 19 percent of the white. No maternal condition of causal significance was reported for 25 percent of the Negro stillbirths and 28 percent of the white.

Although these findings are preliminary and based on relatively few cases, it appears that some of the racial differences are sufficiently great to be of real significance. The differences in the frequency of delivery prior to term and of fetal death before onset of labor (both were markedly greater for Negro than for white) were sufficiently outstanding to indicate that a larger number of cases will afford similar evidence. The greater frequency of syphilis among Negroes is in line with the general experience of obstetric practice. So, too, is the greater frequency of abnormalities of labor among the white.

MATERNAL MORTALITY

The maternal mortality of Negro women is a matter for serious concern. During the period 1933-35 approximately 2,400 Negro women died each year from conditions directly due to pregnancy and childbirth—a mortality rate of 96.1 per 10,000 live births. One Negro woman out of every 12 who died in the reproductive period of life (15 to 44 years) during the period 1933-35 died from a puerperal cause. Diseases of pregnancy and childbirth were responsible for the deaths of more Negro women of these ages than any other disease except tuberculosis.

The most frequent cause of maternal mortality among Negro women was puerperal sepsis. During the period 1933-35 sepsis was responsible for 39 percent of the deaths assigned to puerperal causes. Next in order of importance were the toxemias of pregnancy, which accounted for 29 percent. These two types of causes, which accounted for 68 percent of the maternal deaths among Negro mothers, are recognized as largely preventable. The other 32 percent of the puerperal deaths were mainly due to accidents of pregnancy, puerperal hemorrhages, and accidents of labor.

The number of deaths assigned to the puerperal state, great as it is, does little more than suggest the total loss associated with pregnancy and childbirth. The resistance of many mothers with diseases of the heart, tuberculosis, chronic nephritis, or other long-standing conditions is lowered by pregnancy and childbirth and their deaths are, in many instances, assigned not to puerperal disease but to the disease which preceded their pregnancy. Also, many of the mothers who survive childbirth do so with lowered health status. This morbidity must be mentioned as a definite loss, for the impaired health of the mother results in lowered efficiency and markedly affects the welfare of the family, especially the health and welfare of the newborn child. The Negro mother, even more commonly than the white mother, serves as nurse, cook, and housekeeper and also as an important contributor to the family income. The health and welfare of the child are recognized as wrapped in the health and well-being of the mother. This is even more true for the Negro child than for the white child.

The maternal mortality rate among Negroes (96.1 per 10,000 live births) during the period 1933-35 was greatly in excess of that for white mothers (54.6). (Table 9.) The mortality rate from sepsis was 37.2 among Negroes as compared with 21.8 among the white; from toxemia, 27.5 among Negroes as compared with 11.8 among the white. The mortality rates from accidents of pregnancy (8.7), puerperal hemorrhage (8.2), and other accidents of childbirth (12.4) among Negro mothers were considerably in excess of the rates among white mothers from the corresponding causes—(5.0, 6.1, and 7.0, respectively).

TABLE 9.—*Maternal mortality from specified causes among Negro and white mothers; United States, 1933-35*

Cause of death	Deaths assigned to pregnancy and childbirth per 10,000 live births	
	Negro	White
All puerperal causes.....	96.1	54.6
Puerperal sepsis.....	37.2	21.8
Abortion with septic conditions.....	12.9	9.7
Other puerperal sepsis.....	24.3	12.1
All other puerperal causes.....	59.0	32.8
Toxemias of pregnancy.....	27.5	11.8
Accidents of pregnancy.....	8.7	5.0
Puerperal hemorrhage.....	8.2	6.1
Puerperal phlegmasia, alba dolens, embolus, sudden death.....	2.0	2.8
Other accidents of childbirth.....	12.4	7.0
Other puerperal causes.....	.2	.2

Maternal mortality at specified ages.

The maternal mortality rates for Negro mothers exceeded those for white mothers at every age. (Table 10.) Figures for the period 1933-35 show that the rates for both Negro and white mothers were high in the age period 10 to 14 years (168.8 per 10,000 live births for Negro mothers and 101.6 for white mothers). These are early ages for child-bearing, but in each year of the period, 1933-35, about 1,680 Negro mothers and about 1,180 white mothers, 10 to 14 years of age, gave birth to live-born children (see table 4). Rates for both Negro and white mothers were lowest in the age period 20 to 24 years (70.8 per 10,000 live births for Negroes as compared with 37.8 for white), but here, as well as at all other ages, the rate for Negro mothers was in excess of that for white mothers. After the age of 39 for both Negro and white mothers the maternal mortality rates were in excess of those for mothers of their own race 10 to 14 years of age. The maximum for each race appeared at 45 years and over (259.7 for Negro mothers and 155.6 for white mothers). At these ages about 975 Negro mothers and about 6,255 white mothers gave birth to live-born infants in each year of the period 1933-35.

TABLE 10.—*Maternal mortality among Negro and white mothers of specified ages; United States, 1933-35*

Age of mother	Deaths assigned to pregnancy and childbirth per 10,000 live births	
	Negro	White
All ages.....	96.1	54.6
10 to 14.....	168.8	101.6
15 to 19.....	84.1	44.3
20 to 24.....	70.8	37.8
25 to 29.....	89.3	46.0
30 to 34.....	126.9	65.0
35 to 39.....	164.4	94.3
40 to 44.....	187.7	117.3
45 and over.....	259.7	155.6
Age not reported.....	18.1	18.9

Maternal mortality rates for Negro mothers are available by States only for the year 1935. Rates for a single year are not so reliable an index of the present maternal-mortality situation among Negroes as rates based on a 3-year period. They are, however, of considerable interest and suggest the extent of mortality due to puerperal causes. (Table 11.) In the Southern States the rate was 95.3 per 10,000 live births as compared with 96.1 in the Northern States and 98.7 in the Western. The rates for white mothers were 56.5 in the Southern States, 51.6 in the Northern, and 51.1 in the Western.

Maternal mortality rates for Negro mothers vary widely from State to State. (Fig. 5.) There is no geographic concentration of high and low rates. For example, Oklahoma and Texas, with rates in 1935 of 157.8 and 144.1 per 10,000 live births, respectively, are geographically

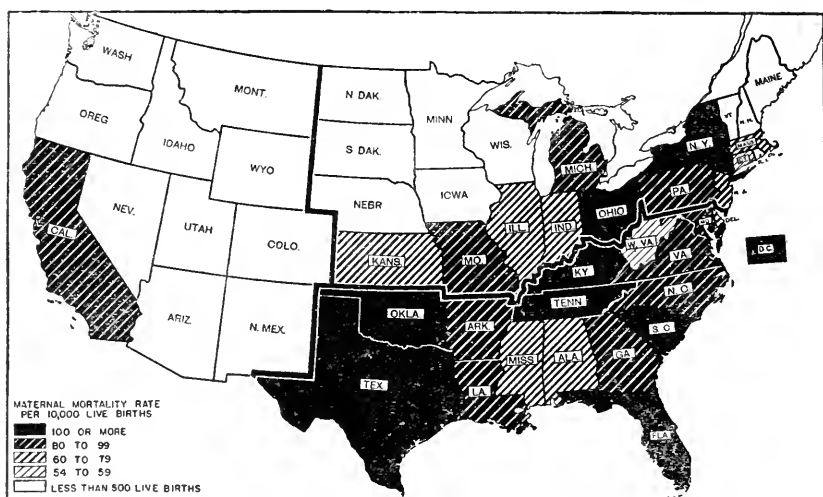


FIGURE 5.—MATERNAL MORTALITY AMONG NEGROES IN STATES WITH 500 OR MORE NEGRO LIVE BIRTHS, 1935.

situated due west of Arkansas and Louisiana, with rates of 81.2 and 99.0, respectively; New York, with a rate of 131.8, is contiguous to Massachusetts (68.3), New Jersey (69.3), and Pennsylvania (89.3).

Maternal mortality rates for Negro mothers in 9 States were in excess of 100 per 10,000 live births (Oklahoma, Texas, Kentucky, New York, Ohio, South Carolina, Florida, District of Columbia, and Tennessee). The rates ranged from 80 to 99 per 10,000 live births in 10 States (Louisiana, Michigan, California, North Carolina, Georgia, Pennsylvania, Missouri, Virginia, Maryland, and Arkansas); from 60 to 79 in 8 States (Alabama, Kansas, Mississippi, New Jersey, Massachusetts, Illinois, Delaware, and Indiana); the rates were less than 60 in 2 States (West Virginia and Connecticut).

In sharp contrast, in this same group of 29 States the rates for white mothers ranged from the maximum of 73.0 per 10,000 live births in Florida to the minimum of 42.4 in Connecticut. For white mothers 8 States had rates from 60 to 73 per 10,000 live births (Florida, South Carolina, Delaware, Louisiana, Texas, Mississippi, Kansas, and Georgia); 12 States had rates from 50 to 59 (Tennessee, Ohio, Massachusetts, Arkansas, Missouri, North Carolina, Pennsylvania, Oklahoma, Alabama, Indiana, West Virginia, and Michigan), and 9 States had rates from 40 to 49 (Illinois, New York, Kentucky, Maryland, Virginia, District of Columbia, California, New Jersey, and Connecticut).

TABLE 11.—*Maternal mortality among Negro and white mothers; geographic sections and 29 States, 1935*

Geographic section and State	Deaths assigned to pregnancy and childbirth per 10,000 live births		Geographic section and State	Deaths assigned to pregnancy and childbirth per 10,000 live births	
	Negro	White		Negro	White
United States.....	95.5	53.1	All Northern States (21).....	96.1	51.6
All Southern States (17).....	95.3	56.5	Connecticut.....	54.2	42.4
Alabama.....	77.5	52.7	Illinois.....	65.1	48.8
Arkansas.....	81.2	55.6	Indiana.....	60.2	52.3
Delaware.....	61.0	65.1	Kansas.....	76.8	60.7
District of Columbia.....	110.6	44.7	Massachusetts.....	68.3	57.2
Florida.....	138.4	73.0	Michigan.....	97.1	51.3
Georgia.....	89.9	60.5	Missouri.....	87.3	54.5
Kentucky.....	143.3	48.4	New Jersey.....	69.3	44.1
Louisiana.....	99.0	64.3	New York.....	131.8	48.7
Maryland.....	81.5	46.0	Ohio.....	130.9	58.3
Mississippi.....	70.5	61.0	Pennsylvania.....	89.3	53.0
North Carolina.....	90.7	53.5	Western States (11).....	98.7	51.1
Oklahoma.....	157.8	52.8	California.....	95.4	44.2
South Carolina.....	118.6	69.4			
Tennessee.....	106.9	59.6			
Texas.....	144.1	63.0			
Virginia.....	82.2	45.9			
West Virginia.....	57.5	51.4			

The maternal mortality rate for Negro mothers in the United States as a whole in 1935 exceeded that for white mothers by 80 percent. In the Southern States the rate for Negro mothers exceeded that for white mothers by 69 percent and in the Northern States, by 86 percent. The greater excess percentage in Northern than in Southern States is due essentially to the lower mortality rates for white mothers in the North. The maternal mortality rates for Negroes in the two sections (96.1 for Northern States and 95.3 for Southern States) are very similar. In 2 Northern States (New York and Ohio), in 4 Southern States (Kentucky, Oklahoma, Texas, and the District of Columbia), and in California the maternal mortality rate for Negroes is more than double the rate for white mothers. In 7 Southern States and in 4 Northern States the maternal mortality rates for Negroes are 50 percent in excess of those for whites. Delaware had a higher

rate for white mothers in 1935 than for Negro mothers; the difference in the rates is, however, too small to be of any real importance. (Fig. 6.)

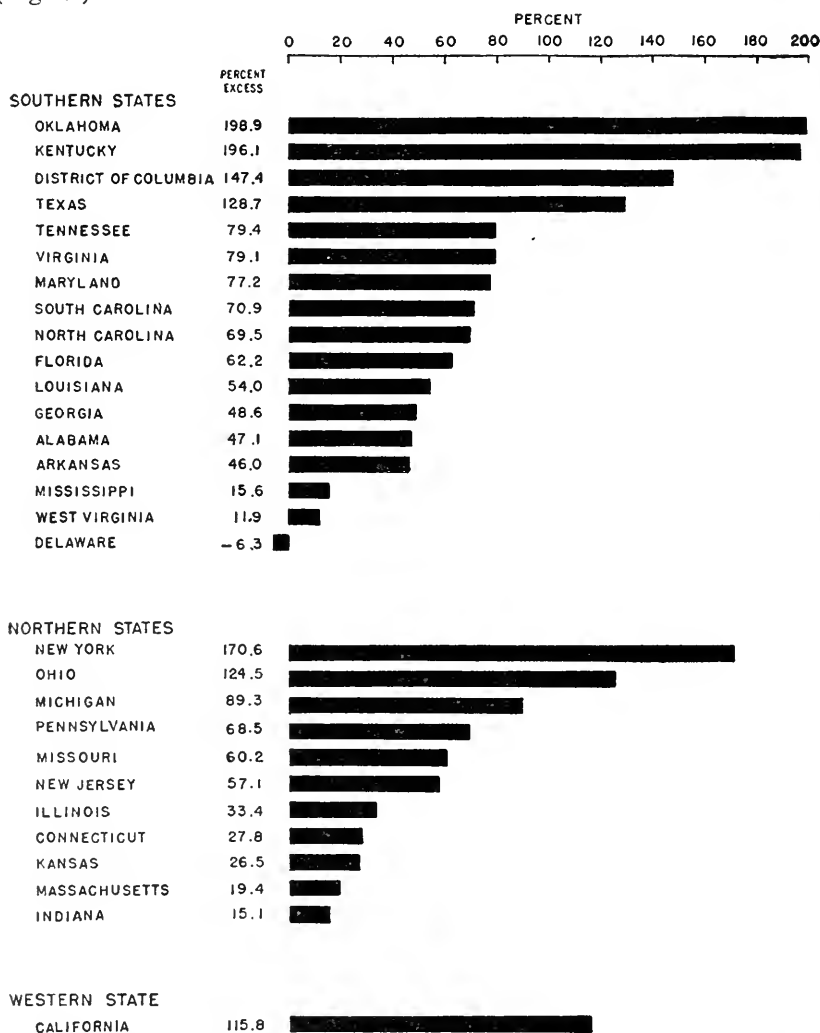


FIGURE 6.—PERCENTAGE EXCESS OF NEGRO MATERNAL MORTALITY RATES OVER WHITE MATERNAL MORTALITY RATES; 29 STATES, 1935.

TRENDS DURING THE PERIOD OF RECORD

Statistics which serve as an index of the loss of life among infants and mothers in the United States date from the establishment of the United States birth-registration area in 1915. For earlier years a certain amount of information on deaths is available, but no reliable statistics on births, and consequently no base from which to measure the number of infants exposed to the risk of dying in their first year of life or the number of mothers exposed to the risk of dying in childbirth. With the establishment of the birth-registration area in 1915 the needed information with respect to births began to be available.

FACTORS AFFECTING TRENDS

Any study of infant and maternal mortality rates in the United States over a period of years involves consideration of the expansion of the birth- and death-registration areas. It involves also consideration of the differences in completeness of registration and the movement of the Negro population.

The birth-registration area of 1915 was composed of the 11 States (including the District of Columbia) which had satisfactory birth-registration laws and were able to show at least 90 percent completeness in registration of births. The area of 1915 included 31 percent of the total population and 6 percent of the Negro population of the United States. The registration area was expanded from year to year as additional States met the requirements for admission. By 1921 the area comprised 28 States; it included 65 percent of the total population and 48 percent of the Negro population of the United States. By 1928 the area comprised 45 States; it included 94 percent of the total population and 93 percent of the Negro population of the United States. Nation-wide statistics of births were finally achieved in 1933, when the last State, Texas, was admitted to the birth-registration area.

During this same period the registration area for deaths, established in 1880, also was rapidly expanded, and by 1933 this area also included the entire continental United States.

States admitted to the birth-registration area at the time the area was established were recognized as having a high percentage of completeness of registration. These were mostly Northern States in which satisfactory laws had long been in effect and the practice of registration had long been established. The States admitted after 1915 had, of course, the 90 percent completeness of registration required for admission. Special studies¹⁰ have pointed out that in most States the percentage of completeness was increased during the years immediately following admission to the area. This completeness, however, was not uniformly maintained. South Carolina, for example, which was admitted in 1919, was dropped in 1925 "after

¹⁰ See footnote 4, p. 2.

failure in two separate tests to reach 90 percent complete registration."¹¹ Special studies¹² also show that as late as 1930 there was wide variation in completeness in the individual States.

The movement of population must be given especial consideration in interpreting trends in infant and maternal mortality among Negroes. It is well known that, beginning shortly after 1915, large numbers of Negroes migrated northward and settled in the great urban centers, where they found not only a climate totally different from that of their previous experience, but also the social and economic conditions of industrialized, densely populated areas. In the South the movement was from plantation to town and from town to city. Some of this movement was intrastate, from plantation to small city, but in many States Negroes in small cities migrated across State lines to larger cities, such as Baltimore, Washington, New Orleans, Atlanta, and Birmingham, where industry offered greater opportunity for gainful employment on a wage basis. The Negroes whose migrations were confined to the South faced problems of adaptation to new environment to a less extent than those who moved North, for the climatic factors were unchanged for them. Living conditions in the city, however, were vastly different from those of the plantation. Here, as in the North, the Negroes were crowded together in slum areas, with inadequate facilities for care of their health and for recreation. The employment opportunities were as a rule in seasonal and irregular work. The earnings, which had seemed great, proved small in purchasing power and provided, at best, meager subsistence.

TRENDS IN INFANT MORTALITY

In the United States expanding birth-registration area, in the geographic sections, and in most of the 29 States with 500 or more Negro live births annually, infant mortality rates of recent years among Negroes are markedly lower than those for the earliest years for which statistics are available. (Table 12.) In several of the States the 1935 infant mortality rate is less than half as high as that of the year in which the State was admitted. The rates in all States show considerable variation from year to year. Many of the variations are unquestionably due to the underlying factors—completeness of registration and movement of population. Had the geographic distribution of the Negro remained constant, it is possible that the downward trend of the rates would have been more rapid.

¹¹ Birth, Stillbirth, and Infant Mortality Statistics, 1925, Part II, p. 5.

¹² See footnote 4, p. 2.

TABLE 12.—Trend of mortality in the first year of life among Negro infants in each geographic section and State with 500 or more Negro live births; United States expanding birth-registration area, 1915-35¹

Geographic section and State	Deaths under 1 year per 1,000 live births																				
	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Expanding birth-registration area 1																					
All Southern States (17)	181	184	151	162	134	136	111	112	120	114	112	112	100	106	101	100	93	84	85	91	82
Alabama	171	197	145	155	131	129	106	107	113	110	106	105	97	103	100	99	91	82	86	92	83
Arkansas													82	95	91	94	77	76	80	85	81
Delaware													77	86	69	56	51	52	65	61	41
District of Columbia							187	203	196	206	132	157	113	125	130	120	155	91	92	107	134
Florida	174	159	159	188	132	139	123	134	143	109	132	123	109	107	118	110	116	108	101	109	96
Georgia										107	105	107	93	95	94	96	91	87	92	90	88
Kentucky														104	93	96	86	78	78	95	81
Louisiana			152	192	147	138	111	157	157	120	119	134	109	118	130	122	137	108	98	117	100
Maryland													109	102	120	103	85	82	89	88	85
Mississippi	210	201	201	215	160	164	147	148	156	129	146	137	135	128	126	121	132	110	104	108	99
North Carolina							85	79	82	88	83	81	78	86	85	83	67	62	75	73	39
Oklahoma			133	140	109	113	95	101	106	110	105	107	109	109	107	103	103	88	90	102	90
South Carolina													(4)	127	133	138	100	98	113	127	110
Tennessee						149	148	123	119	125	127	(4)	(4)	115	110	108	102	92	95	98	96
Texas													107	121	117	115	102	95	102	109	84
Virginia			137	142	120	110	103	102	115	104	111	111	107	105	107	107	108	90	90	99	96
West Virginia											110	124	102	95	96	97	112	104	84	92	72
All Northern States (21)	182	174	172	186	150	162	132	128	141	126	127	128	108	117	109	102	102	93	84	88	79
Connecticut	(4)	(3)	(3)	(3)	154	184	113	111	133	99	117	82	73	107	92	110	103	97	73	76	72
Illinois							127	158	142	123	109	106	106	107	100	90	99	82	84	77	70
Indiana			156	164	136	179	129	129	142	140	119	145	96	102	109	122	81	84	81	93	93
Kansas			164	164	150	160	129	149	156	131	119	152	128	123	115	88	79	111	101	98	78
Massachusetts	163	168	134	160	145	131	117	113	140	102	111	108	103	102	88	98	82	87	79	80	93
Michigan	(3)	(3)	134	131	140	173	118	118	138	121	142	117	97	121	106	87	90	66	68	66	64
Missouri													112	124	122	108	106	111	101	110	84
New Jersey							139	130	125	126	125	123	113	124	105	99	99	93	78	95	77
New York	192	170	177	175	151	160	140	126	122	113	120	133	110	124	112	104	105	93	90	91	83
Ohio			159	178	158	153	122	111	140	114	128	129	103	113	120	108	106	98	89	82	79
Pennsylvania	185	181	195	227	151	167	134	142	152	138	132	140	113	117	106	107	115	99	79	93	81
All Western States (11)	(4)	(4)	(4)	(4)	90	110	81	113	86	90	94	88	105	101	111	101	83	80	74	79	63
California					91	107	77	108	85	92	96	81	92	90	96	80	75	61	61	70	71

¹ The birth-registration area in 1915 included 6.2 percent of the Negro population of the United States; in 1921 it included 48.3 percent; in 1928, 92.8 percent; and in 1933, 1934, and 1935 the entire Negro population of continental United States.² Dropped from the area.³ Rate not shown because the number of Negro live births was less than 500.

The mortality rate for Negro infants in the United States has decreased during the period for which statistics are available. (Fig. 7.) In both 1915 and 1916 more than 180 out of every 1,000 Negro

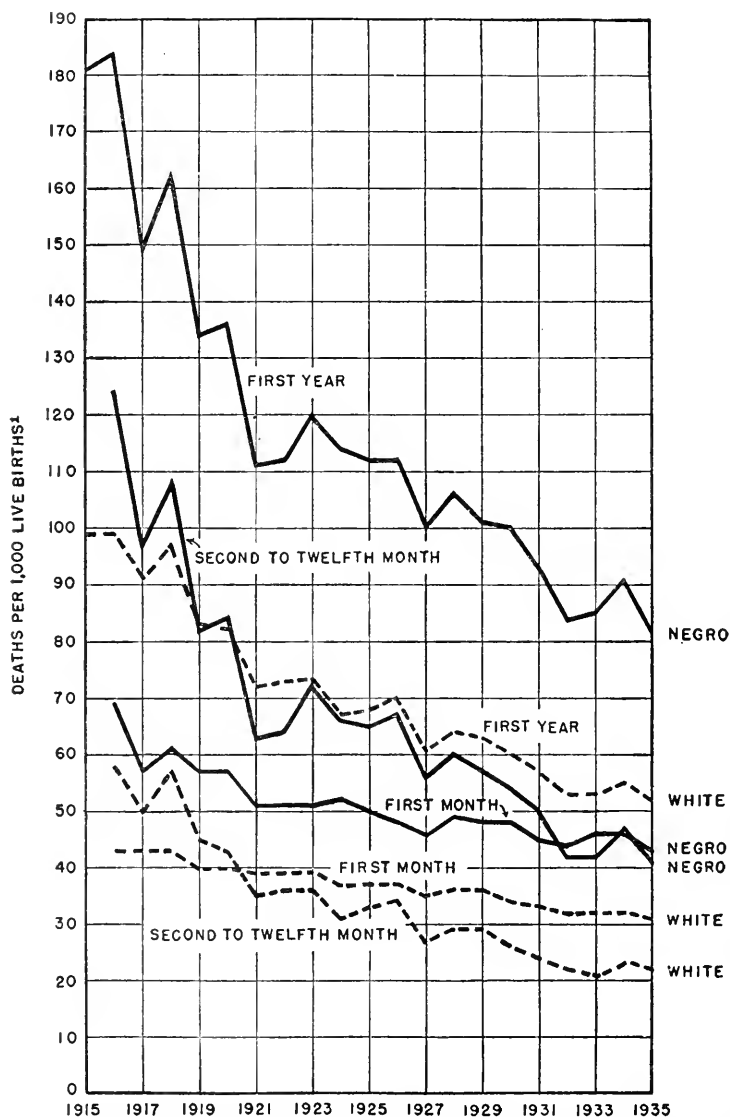


FIGURE 7.—MORTALITY IN CERTAIN PERIODS OF THE FIRST YEAR OF LIFE AMONG NEGRO AND WHITE INFANTS; EXPANDING BIRTH-REGISTRATION AREA, 1915-35.

infants born alive died before reaching their first birthday. In no year from 1932 to 1935 was the rate higher than 91 per 1,000 live births. (Table 13.) In the first month and in the second to the twelfth month decreases are apparent. In 1916, 69 infants, and in

1935, 43 infants out of every 1,000 born alive died before completing their first month of life. In 1916 out of every 1,000 Negro infants who survived the first month of life, 124 died before completing their first year; in 1935 the number was 41.

The mortality among Negro infants today, however, is almost as high as that of white infants at the time the birth-registration area was established. In 1935 the mortality rate for Negro infants was 82 in the first year of life, 43 in the first month, and 41 in the second to the twelfth month. In 1916 the corresponding rates for white infants were 99, 43, and 58, respectively.

TABLE 13.—*Mortality in certain periods of the first year of life¹ among Negro and white infants in the expanding birth-registration area, 1915-35*

Year	Mortality rates in the first year of life ¹					
	Negro			White		
	First year	First month	Second to twelfth month	First year	First month	Second to twelfth month
1915.....	181	(²)	(²)	99	(²)	(²)
1916.....	184	69	124	99	43	58
1917.....	149	57	97	91	43	50
1918.....	162	61	108	97	43	57
1919.....	134	57	82	83	40	45
1920.....	136	57	84	82	40	43
1921.....	111	51	63	72	39	35
1922.....	112	51	64	73	39	36
1923.....	120	51	72	73	39	36
1924.....	114	52	66	67	37	31
1925.....	112	50	65	68	37	33
1926.....	112	48	67	70	37	34
1927.....	100	46	56	61	35	27
1928.....	106	49	60	64	36	29
1929.....	101	48	57	63	36	29
1930.....	100	48	54	60	34	26
1931.....	93	45	50	57	33	24
1932.....	84	44	42	53	32	22
1933.....	85	46	42	53	32	21
1934.....	91	46	47	55	32	22
1935.....	82	43	41	52	31	23

¹ First year and first month, deaths per 1,000 live births; second to twelfth month, deaths per 1,000 infants surviving the first month of life.

² Not available.

In the early years of the period the mortality rate for Negro infants in the second to the twelfth month exceeded that of white infants in the entire first year; from 1923 to 1926 the rates were practically identical; only from 1927 onward has the rate for Negro infants in the second to the twelfth month been substantially lower than that for white infants in the entire first year. In 1932, for the first time, the rate for Negro infants in the second to the twelfth month dropped below that of Negro infants in the first month of life. Since 1921, among white infants the mortality rate in the second to the twelfth month has been lower than that of the first month.

During the period under review the mortality of Negro infants in each period of the first year of life has decreased at about the same rate as that of white infants. The rate for Negro infants for the entire first year decreased on the average¹³ about 3.6 percent annu-

¹³ To bring out the general tendency toward a constant rate of decrease the average annual percentage rate of change has been calculated by the ordinary equation for geometric progression: $\log y = a + bx$. For a full description of method, see *Secular Changes in Mortality Rates Connected with Certain Organ Systems*, by Elizabeth C. Tandy. (*Human Biology*, vol. 3, no. 4 (December 1931), pp. 499-528).

ally ¹⁴ (1915-35); in the first month, about 1.8 percent annually (1916-35); and in the second to the twelfth month of life, about 4.8 percent annually (1916-35). The average annual rate of decrease for white infants was 3.3 percent ¹⁵ for the entire first year, 1.7 per-

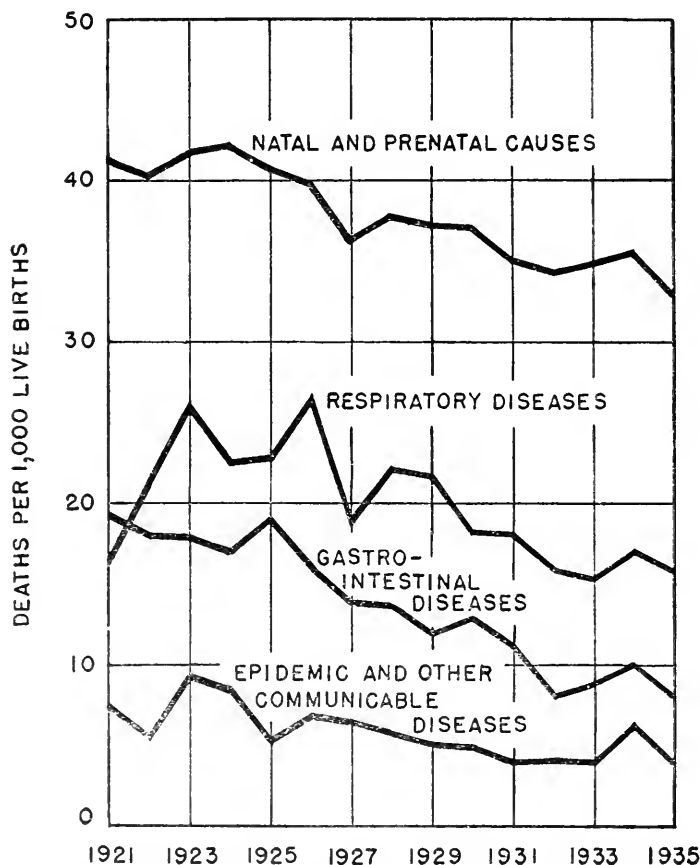


FIGURE 8.—MORTALITY FROM SPECIFIED CAUSES IN THE FIRST YEAR OF LIFE AMONG NEGRO INFANTS; EXPANDING BIRTH-REGISTRATION AREA, 1921-35.

cent for the first month, and 5.0 percent for the second to the twelfth month.

¹⁴ The average annual percentage rate of decrease in mortality during each period of the first year of life among Negro and white infants is:

	Negro	White
First year (1915-35).....	-3.566±.185	-3.258±.115
First month (1916-35).....	-1.816±.125	-1.725±.045
Second to twelfth month (1916-35).....	-4.825±.265	-4.965±.212

¹⁵ The significance of any result is judged by its probable error. The probable error of the difference between any 2 rates of change is calculated by the formula:

$$P. E. \text{ of difference} = \sqrt{(P. E._1)^2 + (P. E._2)^2}$$

A difference is considered significant whenever it exceeds 3 times its probable error.

The mortality in the first year of life from each of the principal causes of death has decreased during the period 1921-35.¹⁶ (Fig. 8 and table 14.) The most outstanding decreases are in the mortality from gastrointestinal and from epidemic and other communicable diseases. Mortality from respiratory diseases also shows a marked drop. Mortality from natal and prenatal causes, which occurs largely in the first month of life, has shown some decrease, but it is relatively small as compared with other principal causes of death in the first year.

TABLE 14.—*Mortality from specified causes in the first year of life among Negro and white infants; expanding birth-registration area, 1921-35*

Year	Deaths under 1 year per 1,000 live births						
	All causes	Natal and pre-natal causes	Gastro-intestinal diseases	Respiratory diseases	Epidemic and other communicable diseases	External and all other causes	Unknown or ill-defined diseases
NEGRO							
1921.....	110.7	41.1	19.2	16.5	7.4	126.5	(1)
1922.....	111.7	40.2	18.0	21.3	8.6	11.3	15.2
1923.....	119.9	41.6	17.9	25.9	9.3	10.6	14.5
1924.....	114.1	42.1	17.0	22.5	8.5	10.6	13.4
1925.....	112.0	40.8	18.9	22.8	5.3	10.4	13.7
1926.....	112.1	39.8	16.0	26.4	6.8	9.7	13.3
1927.....	99.9	36.2	13.8	18.9	6.5	8.8	15.8
1928.....	105.9	37.7	13.6	22.1	5.7	9.1	17.7
1929.....	101.5	37.1	12.0	21.6	5.1	8.8	16.9
1930.....	99.5	37.0	12.9	18.2	4.8	8.6	18.0
1931.....	92.7	35.0	11.1	18.1	4.0	7.8	16.7
1932.....	84.1	34.2	8.1	15.8	4.1	6.7	15.2
1933.....	85.4	34.8	8.8	15.2	4.0	7.6	15.1
1934.....	91.0	35.4	10.1	16.9	6.3	7.7	14.7
1935.....	81.9	32.7	8.1	15.8	3.9	7.6	13.8
WHITE							
1921.....	72.5	35.9	14.5	9.7	4.4	18.0	(1)
1922.....	73.2	36.0	12.4	13.0	3.8	6.6	1.5
1923.....	73.5	35.7	12.2	12.9	5.0	6.4	1.4
1924.....	66.8	34.8	9.5	10.8	4.0	6.3	1.4
1925.....	68.3	34.5	11.5	11.1	3.4	6.5	1.2
1926.....	70.0	34.7	10.0	12.9	4.6	6.5	1.3
1927.....	60.6	32.6	7.9	9.1	3.4	6.0	1.7
1928.....	61.0	33.1	7.9	11.7	3.3	6.0	2.0
1929.....	63.2	32.9	7.2	11.8	3.3	5.8	2.1
1930.....	59.6	31.8	7.8	9.5	2.9	5.4	2.2
1931.....	56.7	31.0	6.4	9.7	2.5	5.1	2.0
1932.....	53.3	30.1	5.1	8.9	2.5	4.6	2.0
1933.....	52.8	30.0	5.3	8.5	2.2	4.7	2.1
1934.....	54.5	30.4	5.8	8.1	3.2	4.8	1.9
1935.....	51.9	28.9	5.2	8.4	2.4	5.1	1.9

¹ Unknown and ill-defined diseases were included in all other causes.

The average annual rate of decrease¹⁷ in mortality from all the principal causes of death¹⁸ among Negro infants has been about the

¹⁶ Statistics regarding cause of death in the first year of life among Negroes are available from 1916 onward. The period 1921-35 has been selected for analysis because only since 1921 has as much as 48 percent of the Negro population of the United States been included in the birth-registration area.

¹⁷ See footnote 13, p. 27.

¹⁸ The average annual percentage rate of decrease in mortality from the principal causes of death among Negro and white infants (1921-35) is:

	Negro	White
Natal and prenatal causes.....	-1.654±.122	-1.585±.062
Respiratory diseases.....	-2.511±.580	-2.524±.465
Gastrointestinal diseases.....	-6.284±.382	-7.132±.353
Epidemic and other communicable diseases.....	-4.499±.760	-4.568±.521

same as among whites.¹⁹ During the period 1921-35 the mortality rate of Negro infants from natal and prenatal causes decreased on the average about 1.7 percent annually; from respiratory diseases, about 2.5 percent; from gastrointestinal diseases, about 6.3 percent; from epidemic and other communicable diseases, 4.5 percent. The average annual rate of decrease among white infants from natal and prenatal causes was 1.6 percent; from respiratory diseases, 2.5 percent; from gastrointestinal diseases, 7.1 percent; and from epidemic and other communicable diseases, 4.6 percent.

TRENDS IN MATERNAL MORTALITY

Information with respect to maternal mortality among Negroes in the United States is available since 1928.²⁰ The mortality rate for Negro mothers has decreased during the period for which statistics are available. (Fig. 9.) In 1928 and 1929 more than 120 Negro mothers died from diseases of pregnancy and childbirth for every 10,000 Negro infants born alive. (Table 15.) In 1934 and 1935 the rates were 93 and 95, respectively. Mortality from puerperal sepsis has decreased. In 1928 and 1929, the rates from sepsis were 42 and 45, respectively, per 10,000 live births, as compared with 36 and 39 in 1934 and 1935. Marked decrease is apparent in the rates from all other puerperal causes. From 1928 to 1930 the rates from these causes were in excess of 76 per 10,000 live births; in 1934 and 1935 the rates were 57 and 56, respectively.

TABLE 15.—*Maternal mortality among Negro and white women; expanding birth-registration area, 1928-35*

Year	Deaths assigned to pregnancy and childbirth per 10,000 live births					
	Negro			White		
	All puerperal causes	Puerperal sepsis	All other puerperal causes	All puerperal causes	Puerperal sepsis	All other puerperal causes
1928.....	122.0	42.5	79.5	62.7	22.9	39.8
1929.....	121.5	44.9	76.6	63.1	24.1	39.0
1930.....	118.9	41.1	77.7	60.8	22.3	38.5
1931.....	112.5	40.9	71.5	60.1	23.0	37.0
1932.....	100.5	35.4	65.1	58.1	21.9	36.3
1933.....	100.0	36.3	63.7	56.4	21.5	34.8
1934.....	93.1	35.8	57.3	54.4	21.8	32.6
1935.....	95.5	39.3	56.2	53.1	21.9	31.1

The mortality rates for Negro mothers in recent years, however, are greatly in excess of those for white mothers in the earliest years of the period under review. In 1935 the mortality rate for Negro mothers from all puerperal causes was 95 per 10,000 live births, from puerperal sepsis, 39, and from all other puerperal causes, 56. The corresponding rates for white mothers in 1928 were 63, 23, and 40, respectively.

¹⁹ See footnote 15, p. 28.

²⁰ Maternal-mortality figures are issued by the U. S. Bureau of the Census for the death-registration area. The birth- and death-registration States are identical from 1928 onward, except that South Dakota was admitted to the death-registration area in 1930 and to the birth-registration area in 1932. In South Dakota there were only 2, 5, 2, and 7 Negro live births in 1932, 1933, 1934, and 1935, respectively. The difference between the death- and birth-registration States of 1930 and 1931 is obviously of no importance as far as Negroes are concerned.

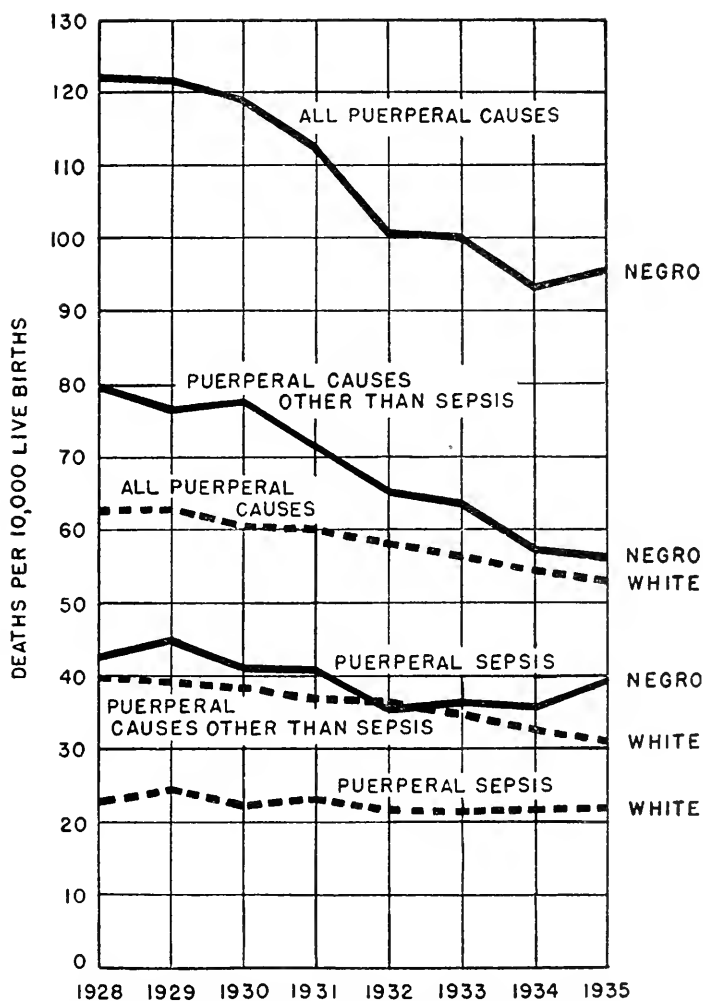


FIGURE 9.—MATERNAL MORTALITY AMONG NEGRO AND WHITE WOMEN; EXPANDING BIRTH-REGISTRATION AREA, 1928-35.

During the period 1928-35 the rates for Negro mothers from all puerperal causes and from causes other than sepsis decreased ²¹ more rapidly ²² than the rates for white mothers. The rates for Negro mothers from all puerperal causes decreased on the average ²³ about 4.3 percent annually, from puerperal sepsis 2.6 percent, and from all other puerperal causes, 5.3 percent. The average annual rate of decrease for white mothers was 2.5 percent from all puerperal causes, 1.2 percent from sepsis, and 3.4 percent from all other puerperal causes.

The rates from sepsis, as from all other puerperal causes, for Negro mothers during this period show a significant decrease, but the increase in 1935 is so great that the average annual rate of decrease for the Negro (2.6 percent) is not significantly different from that for the white (1.2 percent).

²¹ See footnote 13, p. 27.

²² See footnote 15, p. 28.

²³ The average annual percentage rate of decrease in mortality from all puerperal causes, from sepsis, and from all other puerperal causes among Negro and white mothers (1928-35) is:

	Negro	White
All puerperal causes.....	-4.284±.344	-2.544±.125
Puerperal sepsis.....	-2.582±.649	-1.151±.277
All other puerperal causes.....	-5.294±.322	-3.445±.208

SUMMARY

More than 250,000 Negro infants are born alive each year in the United States. Almost two-thirds of these Negro infants are born in the rural areas of the Southern States, but in every large city in the South and in many large cities in the North considerable numbers of Negro births occur each year.

Midwives attend more than half of all Negro live births. In the rural areas of the South about four-fifths of the Negro births are attended by midwives. In Southern cities about three-fourths of the Negro live births are attended by physicians. In Northern cities practically all are attended by physicians and almost two-thirds by physicians in hospitals.

About 22,000 Negro infants die each year in the United States. In every section of the United States the mortality rate for Negro infants is greatly in excess of that for white infants. Mortality rates for Negro infants, on the whole, are higher in urban than in rural areas, but in several States the rates in rural areas are higher than the rates in urban.

More than half the Negro infants who die in the first year of life die in the first month. Natal and prenatal causes are responsible for more deaths than any other cause (deaths from these causes occur largely in the first month of life). Respiratory diseases are second in importance—gastrointestinal diseases third, epidemic and other communicable diseases fourth. The mortality rate from each of these causes is higher among Negro than among white infants.

Mortality among Negro infants decreased greatly during the period 1915-35. Most of the decrease was in the second to the twelfth month of life. The decrease in the first month of life was slight as compared with that in the second to the twelfth month. The decrease has been as rapid among Negro as among white infants, but the mortality rate for Negro infants today is practically as high as that for white infants in the earliest years of record (1915 and 1916).

The stillbirth rate is considerably higher for the Negro than for the white. Preliminary analysis of the special study now under way in the Children's Bureau shows that Negro stillbirths occur more frequently than white in the early periods of gestation and that fetal death prior to onset of labor occurs more often among the Negro than the white. Nonpuerperal diseases of the mother, especially syphilis, are more frequently associated with Negro stillbirths than with white. Abnormalities of labor and delivery are less often reported for the Negro than for the white.

Maternal mortality among Negro women is far greater than that among white women. In several of the States the rate from puerperal causes for Negro mothers is more than double the rate for white mothers. The principal causes of maternal deaths among Negro women, as among white, are puerperal sepsis and toxemias of pregnancy—causes known to be largely preventable.

Maternal mortality rates for Negroes from all puerperal causes, from puerperal sepsis, and from all causes other than sepsis have decreased during the period 1928-35. In spite of these decreases the mortality rate of Negro mothers in 1935 was greatly in excess of that of white mothers in 1928.

The downward trends of the rates for Negro infants and mothers throughout the period of record are probably due largely to the gradual adaptation of the Negro to his environment and to the increasing healthfulness of the community in which he lives. To some extent the downward trends in recent years are associated with the development of maternal and child-health programs, but such programs among Negroes in most sections of this country are still in the pioneer stage.

The high mortality of the present day points out the great need for the development of widespread activities which will help to bring Negro mothers safely through childbirth and Negro infants safely through their first year of life. The wholehearted acceptance by the Negro people of the health facilities that have been made available for their use in the past gives great encouragement to workers who may be active in the development of future programs for safeguarding the health of the Negro mother and infant.



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